

Z.
TWEEDDALE
S.32

JOURNAL
OF THE
ASIATIC SOCIETY OF BENGAL,

EDITED BY
THE SECRETARIES.

VOL. XXIII.

Nos. I. to VII.—1854.

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“It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away, if they shall entirely cease.—SIR WM. JONES.



PRINTED BY J. THOMAS, BAPTIST MISSION PRESS.

1855.





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ABSTRACT STATEMENT  
OF  
RECEIPTS AND DISBURSEMENT  
OF THE  
ASIATIC SOCIETY,  
FOR  
THE YEAR, 1853.



## STATEMENT

Dr. *Abstract Statement of Receipts and Disbursements of the*

## RECEIPTS.

## To MUSEUM.

|                                                                                                                                                                                                               |      |   |   |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|-----------|
| Received from the General Treasury, amount of Government allowance authorized by the Court of Directors for the services of a Curator, from December, 1852, to November, 1853, at 250 Rs. per mensem, ... Rs. | 3000 | 0 | 0 |           |
| Ditto ditto for the preparation of Specimens of Natural History from ditto to ditto at 50 do.                                                                                                                 | 600  | 0 | 0 |           |
|                                                                                                                                                                                                               |      |   |   | 3,600 0 0 |

## To MUSEUM OF ECONOMIC GEOLOGY.

|                                                                                                                                                                                                  |      |   |   |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|-----------|
| Received from the General Treasury, amount of Government allowance authorized by the Court of Directors for the services of a Joint-Curator, from December, 1852, to November, 1853, at 250, ... | 3000 | 0 | 0 |           |
| Ditto for Establishment and Contingencies from ditto ditto, at 64, ...                                                                                                                           | 768  | 0 | 0 |           |
|                                                                                                                                                                                                  |      |   |   | 3,768 0 0 |

## To COMPOSITION FEE.

|                                      |     |   |   |         |
|--------------------------------------|-----|---|---|---------|
| Received from Sir James Colville,... | 500 | 0 | 0 |         |
|                                      |     |   |   | 500 0 0 |

## To CONTRIBUTION AND ADMISSION FEE.

|                                                                 |      |    |   |           |
|-----------------------------------------------------------------|------|----|---|-----------|
| Received from the Members amount of Quarterly Contributions,... | 7778 | 9  | 3 |           |
| Ditto ditto Admission Fees, ...                                 | 384  | 0  | 0 |           |
| Ditto ditto in Advance, ...                                     | 6    | 10 | 6 |           |
|                                                                 |      |    |   | 8,169 3 9 |

## To LIBRARY INCLUDING SALE OF ORIENTAL PUBLICATIONS:

|                                                                                                                                               |      |    |   |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------|----|---|------------|
| Received from Bábu Rájendralál Mittra, Librarian and Assistant Secretary, by Sale of Miscellaneous Books, from January to December, 1853, ... | 1351 | 4  | 0 |            |
| Ditto ditto at Benares, ...                                                                                                                   | 433  | 0  | 0 |            |
| Ditto ditto by Sale of Bibliotheca Indica sold at the Library including Subscriptions to do.                                                  | 306  | 6  | 0 |            |
| Ditto ditto by Professor Hall at Benares, ...                                                                                                 | 85   | 15 | 6 |            |
| Ditto ditto by London Agents, £ 24-12-3 or ...                                                                                                | 246  | 2  | 0 |            |
|                                                                                                                                               |      |    |   | 2,422 11 6 |

## To JOURNAL.

|                                                                                                         |   |   |   |         |
|---------------------------------------------------------------------------------------------------------|---|---|---|---------|
| Received by Sale of the Society's Journal and Subscription to ditto from January to December, 1853, ... | 0 | 0 | 0 | 816 4 0 |
|---------------------------------------------------------------------------------------------------------|---|---|---|---------|

Carried over, ... 19,276 3 3

## No. I.

*Asiatic Society, from the 1st of Jan. to 31st of Dec. 1853.*

Cr.

## DISBURSEMENTS.

## BY MUSEUM.

|                                                                                                              |     |      |   |   |   |            |
|--------------------------------------------------------------------------------------------------------------|-----|------|---|---|---|------------|
| Paid Mr. Blyth's salary as Curator, from December 1852 to November 1853, being 12 months, at Rs. 250, ... .. | Rs. | 3000 | 0 | 0 |   |            |
| Ditto for House-rent ditto ditto at 40, ... ..                                                               |     | 480  | 0 | 0 |   |            |
| Ditto for Establishment at 45 ditto, ... ..                                                                  |     | 540  | 0 | 0 |   |            |
| Ditto charges for repairing the Verandah of the Taxidermists' room, ... ..                                   |     |      | 1 | 3 | 0 |            |
| Ditto Contingencies for preparing Specimens of Natural History, ... ..                                       |     | 241  | 8 | 3 |   |            |
|                                                                                                              |     |      |   |   |   | 4,262 11 3 |

## BY MUSEUM OF ECONOMIC GEOLOGY.

|                                                                                                                                      |  |      |    |   |  |            |
|--------------------------------------------------------------------------------------------------------------------------------------|--|------|----|---|--|------------|
| Paid Mr. H. Piddington's salary as Joint-Curator, from December 1852 to November 1853, being 12 months at 250 Rs. per mensem, ... .. |  | 3000 | 0  | 0 |  |            |
| Ditto Establishment ditto ditto, at 35 ditto, ... ..                                                                                 |  | 420  | 0  | 0 |  |            |
| Ditto Contingencies, ... ..                                                                                                          |  | 267  | 11 | 9 |  |            |
|                                                                                                                                      |  |      |    |   |  | 3,687 11 9 |

## BY MUSEUM OF MINERALOGY AND GEOLOGY.

|                                                                   |  |   |    |   |  |        |
|-------------------------------------------------------------------|--|---|----|---|--|--------|
| Paid Mr. H. Piddington, Curator, for Sundry Contingencies, ... .. |  | 4 | 13 | 0 |  | 4 13 0 |
|-------------------------------------------------------------------|--|---|----|---|--|--------|

## BY LIBRARY.

|                                                                                                     |  |     |    |   |  |           |
|-----------------------------------------------------------------------------------------------------|--|-----|----|---|--|-----------|
| Paid Babu Rajendralal Mittra's salary from December 1852 to November 1853, at 70 per mensem, ... .. |  | 840 | 0  | 0 |  |           |
| Ditto Establishment at 8, ditto, ... ..                                                             |  | 96  | 0  | 0 |  |           |
| Ditto Contingencies, ... ..                                                                         |  | 48  | 9  | 0 |  |           |
| Ditto for Binding Books, ... ..                                                                     |  | 225 | 11 | 0 |  |           |
| Ditto for Freight for Books dispatched to Benares, ... ..                                           |  | 23  | 5  | 9 |  |           |
| Ditto for Extra-writer for copying the Catalogue, ... ..                                            |  | 3   | 5  | 3 |  |           |
| Ditto for preparing Book-shelves, ... ..                                                            |  | 140 | 6  | 0 |  |           |
| Ditto for printing Catalogue, ... ..                                                                |  | 37  | 0  | 0 |  |           |
| Ditto for purchasing Books, ... ..                                                                  |  | 210 | 8  | 9 |  |           |
| Ditto for purchase of Books in London including duty, freight, &c. £37-10-6, ... ..                 |  | 375 | 4  | 0 |  |           |
|                                                                                                     |  |     |    |   |  | 2,000 1 9 |

## BY JOURNAL.

|                                                                                             |  |        |    |   |  |           |
|---------------------------------------------------------------------------------------------|--|--------|----|---|--|-----------|
| Paid Rev. J. Thomas, of the Baptist Mission Press, for Journal up to No. 4, of 1853, ... .. |  | 1,861  | 8  | 6 |  |           |
| Ditto Sundry Draftsmen, Engravers, and Lithographers for Drawing, Engraving, &c. ... ..     |  | 1,505  | 4  | 0 |  |           |
| Ditto P. O. S. N. Company, freight for dispatching Journals to Europe, ... ..               |  | 89     | 5  | 0 |  |           |
| Ditto Contingencies, ... ..                                                                 |  | 40     | 3  | 6 |  |           |
|                                                                                             |  |        |    |   |  | 3,496 5 0 |
| Carried over,...                                                                            |  | 13,451 | 10 | 9 |  |           |

Brought forward, Co.'s Rs. 19,276 3 3

## TO SECRETARY'S OFFICE.

Received fine from Chuprassee's wages, ... 0 12 0 0 12 0

## TO DEPOSIT.

Received from Sir James Colville on account, ... 291 0 0

Received from J. Walker on account, ... 24 0 0  

---

315 0 0

## TO DADOBA PANDURANG, Esq.

Received from him (by transfer), ... 31 0 0 31 0 0

## TO J. BENNETT, Esq.

Received from him (by transfer), ... 306 1 4 306 1 4

## TO F. E. HALL, Esq.

Received from him on account, ... 4 13 0 4 13 0

---

Carried over, ... 19,933 13 7



Brought forward, Co.'s Rs. 13,451 10 9

## BY BUILDING.

|                                                                                                                            |       |   |   |            |
|----------------------------------------------------------------------------------------------------------------------------|-------|---|---|------------|
| Paid R. Ghose, Esq. Collector, Assessment for the premises of the Asiatic Society from November 1852, to July 1853, ... .. | 262   | 8 | 0 |            |
| Ditto H. M. Smith, Esq. for repairing the Society's premises, and building a new portico and a sky-light, ... ..           | 1,171 | 3 | 6 |            |
|                                                                                                                            | <hr/> |   |   | 1,433 11 6 |

## BY SECRETARY'S OFFICE.

|                                                                                             |       |    |   |           |
|---------------------------------------------------------------------------------------------|-------|----|---|-----------|
| Paid General Establishment from December 1852, to November 1853, at 86-8 per mensem, ... .. | 1,038 | 0  | 0 |           |
| Ditto Secy.'s ditto from ditto ditto, ... ..                                                | 652   | 12 | 6 |           |
| Ditto Stationery, &c.,... ..                                                                | 27    | 9  | 0 |           |
| Ditto Postage,... ..                                                                        | 128   | 6  | 0 |           |
| Ditto Petty Charges, ... ..                                                                 | 30    | 1  | 6 |           |
| Ditto for Printing and Lithographing Sundry blank forms, ... ..                             | 29    | 4  | 0 |           |
|                                                                                             | <hr/> |    |   | 1,906 1 0 |

## BY DEPOSIT.

|                                                                                            |       |   |   |        |
|--------------------------------------------------------------------------------------------|-------|---|---|--------|
| Paid for drawing on stone, in Chalk Style, a Monk's-head, on account of Mr. Hodgson,... .. | 6     | 0 | 0 |        |
| Ditto for copying Sundry Books and purchasing papers on account of Lt. Raverty, ... ..     | 26    | 0 | 0 |        |
|                                                                                            | <hr/> |   |   | 32 0 0 |

## BY MISCELLANEOUS.

|                                                                                |       |    |   |         |
|--------------------------------------------------------------------------------|-------|----|---|---------|
| Paid Sundry Contingencies, charges for Meeting and oil for night-guard, ... .. | 183   | 13 | 3 |         |
| Ditto for Advertising Meetings of the Society, ... ..                          | 63    | 3  | 0 |         |
| Ditto J. Chaunce, for winding the clock, ... ..                                | 25    | 0  | 0 |         |
| Ditto Messrs. Augier & Co. for repairing a bronzed lustre, ... ..              | 2     | 8  | 0 |         |
| Ditto Rev. J. Thomas, for executing Miscellaneous Works, ... ..                | 27    | 8  | 0 |         |
|                                                                                | <hr/> |    |   | 302 0 3 |

## BY SIR JAMES COLVILLE.

|                                |       |   |   |         |
|--------------------------------|-------|---|---|---------|
| Paid him (by transfer,) ... .. | 791   | 0 | 0 | 791 0 0 |
|                                | <hr/> |   |   |         |

## BY GOVERNMENT AGENT.

|                                                                         |       |   |   |         |
|-------------------------------------------------------------------------|-------|---|---|---------|
| Paid him to purchase Government paper on account of the Society, ... .. | 500   | 0 | 0 | 500 0 0 |
|                                                                         | <hr/> |   |   |         |

## BY DADOBA PANDURANG, ESQ.

|                                |       |   |   |        |
|--------------------------------|-------|---|---|--------|
| Paid him (by transfer,) ... .. | 31    | 0 | 0 | 31 0 0 |
|                                | <hr/> |   |   |        |

## CONTRIBUTION.

|                                                                                                           |       |   |   |        |
|-----------------------------------------------------------------------------------------------------------|-------|---|---|--------|
| Refunded M. J. Sandes, Esq. on account of H. Torrens, Esq. excess contribution for the 4 qr. 1852, ... .. | 16    | 0 | 0 | 16 0 0 |
|                                                                                                           | <hr/> |   |   |        |

Carried over,... 18,463 7 6

Brought forward, Co.'s Rs. 19,933 13 7

To BALANCE.

As per account closed on the 31st December,

|                                               |                   |               |               |            |
|-----------------------------------------------|-------------------|---------------|---------------|------------|
| 1852, Cash in hand and at the Bank, ...       | 2,748             | 6             | 10            |            |
| Ditto with London Agents, £101-8-0, or at 21, | 1,014             | 0             | 0             |            |
|                                               | <u>          </u> | <u>      </u> | <u>      </u> | 3,762 6 10 |

To GOVERNMENT AGENT.

|                                               |                   |               |               |       |
|-----------------------------------------------|-------------------|---------------|---------------|-------|
| To a piece of Government paper as per contra, | 500               | 0             | 0             |       |
|                                               | <u>          </u> | <u>      </u> | <u>      </u> | 500 0 |

|           |               |          |          |
|-----------|---------------|----------|----------|
| Co.'s Rs. | <u>24,196</u> | <u>4</u> | <u>5</u> |
|-----------|---------------|----------|----------|

Brought forward, Co.'s Rs. 18,463 7 6

BY BALANCE.

|                                    |     |     |       |    |            |
|------------------------------------|-----|-----|-------|----|------------|
| In the Bank of Bengal,             | ... | ... | 3,911 | 11 | 5          |
| Cash in hand,                      | ... | ... | 99    | 11 | 5          |
| With London Agents £88-9-9 or,     | ... | ... | 884   | 14 | 0          |
| Invested in Government Securities, | ... | ... | 500   | 0  | 0          |
|                                    |     |     |       |    | <hr/>      |
|                                    |     |     |       |    | 5,396 4 10 |

INEFFICIENT BALANCE.

|                                          |     |     |     |    |                      |
|------------------------------------------|-----|-----|-----|----|----------------------|
| Due by H. M. Smith, Esq.                 | ... | ... | 200 | 0  | 0                    |
| Ditto, ditto Lieut. Raverty,             | ... | ... | 21  | 8  | 10                   |
| Ditto, ditto E. Blyth, Esq.              | ... | ... | 82  | 2  | 0                    |
| Ditto, ditto R. N. Cust, Esq.            | ... | ... | 1   | 8  | 0                    |
| Ditto, ditto H. Templeton, Esq.          | ... | ... | 1   | 8  | 0                    |
| Ditto, ditto Petty Charges for December, | ... | ... | 29  | 13 | 3                    |
|                                          |     |     |     |    | <hr/>                |
|                                          |     |     |     |    | 336 8 1              |
|                                          |     |     |     |    | <hr/>                |
|                                          |     |     |     |    | Co.'s Rs. 24,196 4 5 |
|                                          |     |     |     |    | <hr/>                |

E. E.

(Signed)

RA'JENDRALA'L MITTRA,

*Assistant Secretary.*



## STATEMENT

Dr.

The Oriental Publication Fund to

## 1853.—TO CUSTODY OF ORIENTAL WORKS.

|                                                                                                                                                 |     |   |   |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|---|-----------|
| Paid Bábu Rájendralál Mittra, his salary for the Custody of Oriental Works from December, 1852, to November, 1853, at 30 Rs. per mensem, ... .. | 360 | 0 | 0 |           |
| Ditto Establishment for ditto ... ..                                                                                                            | 144 | 0 | 0 |           |
| Ditto Book-binding, ... ..                                                                                                                      | 54  | 0 | 0 |           |
| Ditto Contingencies for ditto, ... ..                                                                                                           | 12  | 6 | 6 |           |
| Ditto Govind Mistry for three Glazed Cases, ... ..                                                                                              | 760 | 0 | 0 |           |
| Ditto Messrs. Lackersteem & Co. 8 Wrought Iron Clamps with screws, &c. for Book-shelves, ... ..                                                 | 35  | 0 | 0 |           |
|                                                                                                                                                 |     |   |   | 1,365 6 6 |

## TO BIBLIOTHECA INDICA.

|                                                                           |   |   |   |          |
|---------------------------------------------------------------------------|---|---|---|----------|
| Paid Dr. E. Roër, his salary and Establishment for December, 1852, ... .. | 0 | 0 | 0 | 161 14 0 |
|---------------------------------------------------------------------------|---|---|---|----------|

## TO LALITA VISTARA.

|                                                                             |    |   |   |         |
|-----------------------------------------------------------------------------|----|---|---|---------|
| Paid Bábu Rájendralál Mittra, editing charges on account, ... ..            | 42 | 0 | 0 |         |
| Ditto Rev. J. Thomas for printing No. 51, of the Bibliotheca Indica, ... .. | 69 | 0 | 0 |         |
|                                                                             |    |   |   | 111 0 0 |

## TO HISTORY OF CHINA.

|                                                                                                     |   |   |   |         |
|-----------------------------------------------------------------------------------------------------|---|---|---|---------|
| Paid J. Corcoran, Esq. for 20 copies of the 2nd vol. of his Urdu History of China, per bill, ... .. | 0 | 0 | 0 | 240 0 0 |
|-----------------------------------------------------------------------------------------------------|---|---|---|---------|

## TO SA'NKYA PRAVACHANA BHA'SHYA.

|                                                                                              |   |   |   |       |
|----------------------------------------------------------------------------------------------|---|---|---|-------|
| Paid Agents of the Inland Transit Company hire on a parcel sent to Benares, per bill, ... .. | 0 | 0 | 0 | 7 7 0 |
|----------------------------------------------------------------------------------------------|---|---|---|-------|

## TO DICTIONARY OF TECHNICAL TERMS.

|                                                             |     |   |   |          |
|-------------------------------------------------------------|-----|---|---|----------|
| Paid Moulouvie Mohammed Wajeel for postage per bill, ... .. | 13  | 8 | 0 |          |
| Ditto ditto, ... ..                                         | 11  | 4 | 0 |          |
| Ditto Abdul Hoqq for copying MSS. ... ..                    | 180 | 0 | 0 |          |
| Ditto Mohammadee for ditto, ... ..                          | 14  | 6 | 1 |          |
| Chummu peon, his salary for 22 days of Oct....              | 1   | 9 | 6 |          |
|                                                             |     |   |   | 220 11 7 |

## TO BLACK YAJUR SANHITA.

|                                     |     |   |   |         |
|-------------------------------------|-----|---|---|---------|
| Paid Dr. E. Roër on account, ... .. | 165 | 0 | 0 |         |
| Ditto for Paper, ... ..             | 0   | 6 | 0 |         |
|                                     |     |   |   | 165 6 0 |

## TO ITQUAN.

|                                                                                     |     |   |   |         |
|-------------------------------------------------------------------------------------|-----|---|---|---------|
| Paid Moneeruddeen for copying MSS. ... ..                                           | 12  | 0 | 0 |         |
| Ditto Rev. J. Thomas for printing Nos. 44 and 49, of the Bibliotheca Indica, ... .. | 444 | 0 | 0 | 456 0 0 |

Carried over, ... 2,727 13 1

No. 2.

*Account Current with the Asiatic Society.*

Cr.

## BY BALANCE.

|                             |     |       |     |       |             |
|-----------------------------|-----|-------|-----|-------|-------------|
| In Company's Paper with Go- |     |       |     |       |             |
| vernment Agent, ...         | Rs. | 7,000 | 0   | 0     |             |
| Cash in their hands,        | ... | 1,077 | 15  | 10    |             |
|                             |     |       |     |       | 8,077 15 10 |
| Bank of Bengal, ...         | ... | ...   | ... | 1,397 | 15 3        |
| Cash in hand, ...           | ... | ...   | ... | 37    | 11 9        |
|                             |     |       |     |       | 9,513 10 10 |

## BY GOVERNMENT GRANT.

|                                                                                                                                                                                     |     |     |   |   |   |       |   |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---|---|---|-------|---|---|
| Received from the General Treasury, being the monthly grant sanctioned by the Court of Directors from December, 1852, to November, 1853, being twelve months at 500 Rs. per mensem, | ... | ... | 0 | 0 | 0 | 6,000 | 0 | 0 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---|---|---|-------|---|---|

## BY LOAN.

|                                   |     |   |   |    |
|-----------------------------------|-----|---|---|----|
| Received from the Society's Cash, | ... | 6 | 7 | 11 |
|-----------------------------------|-----|---|---|----|

Carried over,... 15,520 2 9

|                                                                                                                                                         |       |    |    |                                       |       |    |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----|----|---------------------------------------|-------|----|---|
|                                                                                                                                                         |       |    |    | Brought forward, Co.'s Rs. 2,727 13 1 |       |    |   |
| To KHIKD NAMEH ISKANDARY.                                                                                                                               |       |    |    |                                       |       |    |   |
| Paid Rev. J. Thomas, for printing No. 43 of the Bibliotheca Indica, containing the first fasciculus of the above, ... ..                                | 256   | 0  | 0  | 256                                   | 0     | 0  |   |
| To PURCHASE of MSS.                                                                                                                                     |       |    |    |                                       |       |    |   |
| Paid Ensign Lees, for a copy of a Commentary on the Koran, ... ..                                                                                       | 0     | 0  | 0  | 100                                   | 0     | 0  |   |
| To CHAITANYA NA'TAK.                                                                                                                                    |       |    |    |                                       |       |    |   |
| Paid Bábu Rájendralál Mittra, editing charges on account, ... ..                                                                                        | 100   | 0  | 0  |                                       |       |    |   |
| Ditto Rev. J. Thomas, for printing Nos. 47 & 48, of the Bibliotheca Indica, ... ..                                                                      | 435   | 4  | 0  |                                       |       |    |   |
|                                                                                                                                                         |       |    |    |                                       | 535   | 4  | 0 |
| To BIOGRAPHICAL DICTIONARY.                                                                                                                             |       |    |    |                                       |       |    |   |
| Paid Abdul Ghani for copying MSS. ... ..                                                                                                                | 30    | 0  | 0  |                                       |       |    |   |
| Ditto Mohammadee for ditto, ... ..                                                                                                                      | 5     | 13 | 1  |                                       |       |    |   |
| Ditto Golam Kadir for ditto, ... ..                                                                                                                     | 35    | 0  | 0  |                                       |       |    |   |
| Ditto Keramut Ullah for ditto, ... ..                                                                                                                   | 0     | 12 | 0  |                                       |       |    |   |
| Ditto Chummu peon, his salary for 22 days of October, ... ..                                                                                            | 1     | 9  | 6  |                                       |       |    |   |
| Ditto Postage, ... ..                                                                                                                                   | 15    | 2  | 0  |                                       |       |    |   |
|                                                                                                                                                         |       |    |    |                                       | 88    | 4  | 7 |
| To SA'HITYA DARPANA.                                                                                                                                    |       |    |    |                                       |       |    |   |
| Paid Rev. J. Thomas for Nos. 53-54-55 of the Bib. Indica, ... ..                                                                                        | 666   | 0  | 0  | 666                                   | 0     | 0  |   |
| To ISHA, &c. UPANISHAD.                                                                                                                                 |       |    |    |                                       |       |    |   |
| Paid Mr. MacArthur for No. 50 of the Bib. Indica, ... ..                                                                                                | 245   | 0  | 0  | 245                                   | 0     | 0  |   |
| To UTTARA NAISHADA.                                                                                                                                     |       |    |    |                                       |       |    |   |
| Paid Rev. J. Thomas, cost for printing, Nos. 40, 42, 45, 46, 52, and 56 of the Bibliotheca Indica, being fasciculi 2 & 3 of the Uttara Naishada, ... .. | 1,338 | 0  | 0  |                                       |       |    |   |
| Ditto Dr. E. Roër, editing charges on account current, ... ..                                                                                           | 315   | 13 | 0  |                                       |       |    |   |
|                                                                                                                                                         |       |    |    |                                       | 1,653 | 13 | 0 |
| To BLACK YAJUR BRA'HMANA.                                                                                                                               |       |    |    |                                       |       |    |   |
| Paid Bábu Rájendralál Mittra, on account editing charges, ... ..                                                                                        | 70    | 0  | 0  |                                       |       |    |   |
|                                                                                                                                                         |       |    |    |                                       | 70    | 0  | 0 |
| To BALANCE.                                                                                                                                             |       |    |    |                                       |       |    |   |
| Company's paper with the Government Agent, ... ..                                                                                                       | 7,000 | 0  | 0  |                                       |       |    |   |
| Cash with ditto, ... ..                                                                                                                                 | 1,077 | 15 | 10 |                                       |       |    |   |
| Balance in the Bank of Bengal, ... ..                                                                                                                   | 817   | 0  | 3  |                                       |       |    |   |
|                                                                                                                                                         |       |    |    |                                       | 8,895 | 0  | 1 |
| To INEFFICIENT BALANCE.                                                                                                                                 |       |    |    |                                       |       |    |   |
| Due by Sariat Wollah Duftory, ... ..                                                                                                                    | 20    | 0  | 0  |                                       |       |    |   |
| Ditto Petambur Paul, ... ..                                                                                                                             | 263   | 0  | 0  | 283                                   | 0     | 0  |   |
|                                                                                                                                                         |       |    |    | Company's Rupees, 15,520 2 9          |       |    |   |



1854.]

*Proceedings of the Asiatic Society.*

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Brought forward, Co.'s Rs. 15,520 0 1

Company's Rupees, 15,520 0 1

## STATEMENT No. 3.

| ASSETS.                                                                     |                    | LIABILITIES.                                                                          |                   |
|-----------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------|-------------------|
| Cash in hand, .....                                                         | Rs. 5,232 12 11    | Due to Sir James Colvile, .....                                                       | Rs. 291 8 0       |
| Amount of outstandings on account of contribution and admission fees, ..... | 6,437 7 5          | Ditto, to J. W. Laidlay, Esq., .....                                                  | 418 7 4           |
| Ditto, on account subscription to the Journal, ..                           | 1,772 12 0         | Ditto, Dr. A. Sprenger, .....                                                         | 6 10 6            |
| Ditto, on account sale of ditto, .....                                      | 285 8 0            | Ditto, F. E. Hall, Esq., .....                                                        | 4 13 0            |
| Ditto, on account sale of books, .....                                      | 393 4 0            | Ditto, J. Walker, Esq., .....                                                         | 24 0 0            |
| Ditto, on account Bibliotheca Indica, .....                                 | 309 14 0           | Ditto, Mr. Smith on account of new beams, .....                                       | 500 0 0           |
| Ditto, from the Batavian Society of Arts and Sciences, .....                | 83 1 9             | Ditto, Rev. J. Thomas, for Nos. V. VI. and VII. of the Journal for 1853, about, ..... | 700 0 0           |
| Ditto, from Lieut. Raverty, .....                                           | 21 9 0             |                                                                                       |                   |
| Ditto, from B. H. Hodgson, Esq., .....                                      | 1 8 0              |                                                                                       |                   |
| Company's Paper, .....                                                      | 500 0 0            |                                                                                       |                   |
|                                                                             | <u>15,037 13 1</u> |                                                                                       | <u>1,945 6 10</u> |

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# JOURNAL

OF THE

# ASIATIC SOCIETY.

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No. I.—1854.

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*A Twenty-second Memoir on the Storms of the Indian and China Seas; Cyclones and Tornadoes of the Bay of Bengal from 1848 to 1852. By HENRY PIDDINGTON, President of Marine Court.*

The publication of these Memoirs is often delayed longer than is perhaps agreeable to those who look for them, as being interested in the subject, and by those who, having contributed notices are desirous of seeing the results of them announced. This arises from various causes, the principal of which is that it is often necessary where the data are incomplete, to wait a long time for the return of outward bound ships from Europe, and then that in the interval some new and more urgent claims to the little time I can devote to them arises, and thus they fall into arrears. I should also in fairness add to this little explanation, my unwillingness to trespass on the kindness of the Editors of the Journal, who must afford to each of the various classes of their readers and contributors a fair share of space.

The present Memoir then comprises the investigation or notices of ———

- I. The Noacolly Tornado of May, 1844.
- II. The *Nussur's* Tornado of July, 1848.
- III. The Chittagong (stationary) Cyclone of May, 1849.
- IV. The *Erin's* Cyclone in the Preparis Passage and Andaman Sea, of November, 1850———making thus a series of short Memoirs

No. LXV.—NEW SERIES. VOL. XXIII.

B

each of which is separately considered before the next is entered upon. The three first will be found to be highly interesting to Meteorologists, as connecting, so to say, the Tornado with the stationary Cyclone, and the last from its remarkable track between two Volcanic Islands!

## I.

### THE NOACOLLY TORNADO OF 1814.

From the *Bengal Hurkaru* of 23rd May, 1814, I have abridged the following account of a very violent tornado-Cyclone which appears to have travelled to the Eastward of the Meridian.

“On the 11th instant this station (Noacolly) was visited with the most violent tornado (if I may be allowed the expression) that has occurred within the memory of the oldest inhabitant. It began to blow very strong from the S. E. at day break, and the gale continued to freshen to 11 o'clock, when its fury became irresistible. After blowing about two hours from the East and South East the wind veered round by the Northward and returned with redoubled violence carrying every thing before it. Providentially it abated at 4 P. M., for had it continued during the night, dreadful would have been the consequences.” The writer then goes on to detail the danger sustained at the station in houses, bungalows, trees, cattle, native huts, boats, &c., and the sea rose above ten feet above its usual level, doing vast mischief by the inundation, and as an example of the force of the wind, he states that the Surgeon of the station whose bungalow was destroyed, though a stout athletic man, was repeatedly blown down in the fields while endeavouring to reach another house for shelter, and was an hour and a half travelling the distance of half a mile, and that thatched roofs and beams were blown to incredible distances.

In violence, then, there is therefore no doubt that this equalled a West Indian hurricane. And if we take the veering to have been, as well as we can make out from this account, from S. E. to North, this would give it a track to the E. N. E. from the W. S. W.

This tornado was also felt in great fury, for about four hours at Chittagong, where the rise of the water is stated to have been seven or eight feet beyond the mark of the high spring tides. I have not

been able to discover any farther notices of its ravages, nor any data as to the time at which it was felt at Chittagong, which being only sixty miles to the S. S. E. of Noacolly it is quite possible that it was the southern part of the same Cyclone in its passage as above described.

## II.

### THE SHIP NUSSUR'S TORNADO.

*Abridged Reports of Mr. BRANCH PILOT SHEARMAN RANSOM to Captain H. L. THOMAS, Master Attendant, Calcutta.*

I have the melancholy duty to report the loss of the Barque "*Nussur*" near the Outer Floating Light about 2 A. M. this morning. I have succeeded in saving nine men whom I picked off the floating wreck; they relate that the ship was struck by a very heavy squall and capsized, foundering immediately. They can give no account of the Captain, Officers, or Pilot; the last seen of them was, that they were standing together on the poop. I have made all possible search among the mass of wreck but cannot find any trace of Europeans. I am obliged to curtail this account as a ship is in waiting for a Pilot. We experienced a heavy gale for a few hours from midnight to 4 A. M. this morning, I stood to sea and have escaped without damage.

### No. 2.

In my letter to you of the 16th instant I was compelled from the want of time to give you but a very short account of the weather and occurrences at this station during the 15th, 16th and 17th instant, I beg to forward the following in continuation.

The 15th commenced with fresh breezes and squally from East and veering by 3 P. M. to N. N. W. but very uncertain in strength, passing showers of rain and a heavy swell from the Southward, I consulted the two Barometers which I have frequently, and found that they continued falling all day; at 6 P. M. they were at 29.56 and did not go lower during the breeze. I was under weigh all this day expecting some vessels out; 3 P. M. I took Mr. Fielder, Mate, out of the "*Lady Bruce*" and observed three other outward bound vessels to anchor. The wind being light and tide setting into the reef 6.20 P. M. I anchored, double reefed my topsails and got all ready



for heavy weather, the surrounding vessels bore as follows: "*Torch*" Floating Light Vessel East  $\frac{1}{2}$  S. distant three miles; "*Nussur*" at anchor, N. W. four miles; "*Faizle Curree*" ditto, N. by W. five miles; "*Samarang*" ditto, N. N. W. seven to eight miles.

At this time a dense bank of dark threatening clouds had collected to the S. W. with frequent flashes of lightning; between 10 and 11 P. M. the wind shifted to the Southward, when I weighed and put my vessel in a position to meet the outward bound vessels. I had scarcely secured my anchor when this threatening appearance burst upon us in all its fury, and the sea rose in the most unparalleled manner I ever witnessed. As a swell before, it was high; but it now turned into perfect breakers, my anxiety for the ships to the Northward became great, for I knew their anchors would never hold them in such weather, and without they could get to sea their position would be highly dangerous. I could be of no assistance to them, as no boat would live in the sea then running, I consequently proceeded to the Southward under foretopmast staysail and foresail, being as much sail as the vessel could carry; at midnight I suddenly lost sight of the Floating Light's lanthorn. 16th, from midnight to 3 A. M. it blew a gale of wind, and then commenced to moderate, set the double-reefed main topsail keeping the yard on the cap. The *Megna* shipped one or two rather heavy seas, but sustained no damage or loss in any thing; 5.30 A. M. I wore round and stood back in a track to meet the vessels coming out; at 7.30 A. M. took Mr. Keymer, Master, out of the Emigrant ship "*Faizle Curree*;" Noon took Mr. W. Jackson, Master, out of the barque "*Samarang*." The *Nussur* was now the only missing Vessel, and we were anxiously looking for her; at 0.30 P. M. sighted a vessel to the N. N. West with a Jack up, also the Floating Light in the same direction; at 1.20 P. M. bore away to close with the stranger; at 1.30 P. M. the report was given of men being seen floating in the water, the next instant we found ourselves among a mass of wreck such as spars, hencoops, chests, doors, &c. &c. also men in all directions, evidently showing that some fatal accident had occurred. The vessel was hove to instantly, and I am happy to say, under Providence, we were instrumental in saving eleven men. My mate Mr. W. E. Revett was very active in the boat, and states that he took one man off Mr.

Spences' cot; that his chest with name on was alongside him, but as life was at stake, he did not stop to pick them up. I much fear we did not save all that were about us, for blowing hard as it was even then, the vessel drifted so fast to leeward that we lost sight of the things, and the "*Alexander Baring*" being close to me requiring a Pilot I went to her and put the saved men on board. Before I could work to windward again to the wreck, a second vessel met me requiring a Pilot; after supplying her it was dusk, and we had lost all traces of the wreck now. I continued working to windward all night.

17th. At daylight I again stood down to the S. East and fortunately met parts of the same wreck again, but I am sorry to say no survivors on it. We also saw one of the Quarter Boats, stove, returning in again to the N. W. examining every speck we saw, when about eight miles from the Light Vessel she then bearing about N. West, we fell in with two top-gallant masts standing almost upright in the water and evidently fast by something at the bottom by the tide running past them. I ran close to one and passed a four inch rope over it endeavouring to disengage one of them, but the rope parted. This wreck lay in twenty fathoms water. Floating Light bearing about N. E. by E. distance seven miles. I cannot give you any further account of how the "*Nussur*" met her fate beyond what I did in my first letter. I have since been on board the "*Torch*" Floating Light Vessel to ascertain whether they received any damage, or had seen any thing of the wreck. Mr. Bunn states that about midnight of the 15th they saw a Barque under small sail close to him and hoisted the peak light for him; at this instant the "*Torch*" was struck by one of those tremendous rollers, and the hatch being off (they were veering away cable) the vessel was near foundering from the immense quantity of water that got below, he states five feet being in her at one time, and that had a second sea followed she must have foundered. The crew were all panic-stricken and floating about the decks, also the hatches which were lost for a time; on recovering from their fright they looked for the Barque, but nothing could be seen of her. The "*Torch*" has not sustained any loss or damage.

| 1848.   | Ship's Barometer,<br>by Troughton and Simms. |          |         |          | Mean of Thermo-<br>meter. | Barometer and weather from 1st<br>to 18th July by Mr. B. Pilot<br>S. Ransom, Commanding Megna<br>P. V.                                                                                               |
|---------|----------------------------------------------|----------|---------|----------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | 4 A. M.                                      | 10 A. M. | 4 P. M. | 10 P. M. |                           |                                                                                                                                                                                                      |
| July,   |                                              |          |         |          |                           |                                                                                                                                                                                                      |
| 8th ..  | ..                                           | 29.92    | 29.85   | 30.00    | 86.0                      | Pleasant southerly breezes and<br>fine; P. M. squally from N. W.                                                                                                                                     |
| 9th ..  | 29.80                                        | .92      | .83     | 29.84    | 83.0                      | Heavy rain and squally from<br>S. S. W.                                                                                                                                                              |
| 10th .. | .96                                          | .92      | .91     | ..       | 84.30                     | Ditto ditto from South; latter<br>moderate and fine.                                                                                                                                                 |
| 11th .. | .96                                          | .96      | .94     | .90      | 84.0                      | Ditto ditto                                                                                                                                                                                          |
| 12th .. | .96                                          | .92      | .82     | .97      | 85.0                      | Light S. S. W. breezes and fine<br>weather, sea smooth.                                                                                                                                              |
| 13th .  | .82                                          | .86      | .75     | .83      | 85.30                     | Ditto S. S. E. and fine.                                                                                                                                                                             |
| 14th .. | .86                                          | .80      | .64     | .73      | 85.0                      | First part light Easterly airs;<br>middle and latter increasing from<br>East and squally.                                                                                                            |
| 15th .. | .66                                          | .66      | .57     | .56      | 84.0                      | Throughout squally with rain,<br>wind very uncertain, going from<br>East to North, with a high South-<br>erly sea; 6 P. M. calm, dense bank<br>of clouds to S. W.; 11 P. M. hard<br>gale at W. S. W. |
| 16th .. | .53                                          | .66      | .68     | .76      | 84.0                      | First part hard gale with most<br>tremendous sea, 4 A. M. moderat-<br>ing at W. S. W.; latter moderate,<br>little or no rain or lightning during<br>this gale.                                       |
| 17th .. | .65                                          | .71      | .62     | .68      | 83.30                     | Moderate breezes W. S. W. to<br>West; middle and latter high sea,<br>dark rainy weather.                                                                                                             |
| 18th .. | .65                                          | .70      | .60     | .63      | 83.0                      | Ditto winds S. E. to West;<br>squally and rainy throughout.                                                                                                                                          |

*Abridged Reports of Mr. Branch Pilot B. HERITAGE, and R. HAND, Master Pilot, W. JACKSON, and Mate Pilot R. REAN, to Captain H. L. THOMAS, Master Attendant.*

## No. 1.

I have the honour to inform you that last evening I came to an anchor in a calm in twenty fathoms South Channel at 10-30 P. M. suddenly a strong breeze came from S. E. veered away cable to one hundred and twenty fathoms, to ease the vessel that I might keep my station, but the wind increasing to a strong gale from South, drawing to the westward with a heavy sea; the vessel labouring much, began to drive and shoaled into fourteen and half fathoms.

I deemed it prudent to cut for the preservation of the vessel and those on board and put to sea under close-reefed topsails. Sand-heads, *Flame* P. V., July 17th, 1848.

B. HERITAGE,

B. P.

## No. 2.

I have the honour in reply to your letter No. 1664 of the 9th instant, to give the following statement of the weather on the night of the 16th instant.

The first of it commenced about 10 P. M. with a heavy squall from the W. S. W. which lasted till 11 P. M. when it gradually decreased into passing squalls, but very heavy for the time they lasted, which was until 1 A. M. when the weather became moderated, and set in with a fresh W. S. W. to S. W. breeze. There was a heavy sea on during the squalls which occasioned the "Colleroon" though light, to pitch her jib-boom under, and once or twice the end of her main-boom.

Having the Light Station, I considered it my duty for the safety of shipping coming into the port to keep my position as long as I could with safety to the vessel and lives on board, consequently I gave her one hundred and eighty fathoms of cable and rode it out.

R. HAND,

B. P.

## No. 3.

I beg to say that I left Saugor Point at 10 A. M., on that day with the Barque *Samarang* under my pilotage charge, the wind was



at North a moderate royal breeze. Towards noon it fell light and went round to E. N. E. falling almost a calm, the sea in the channel was nothing to speak of during the day at 5-30 P. M. I anchored in quarter less seven fathoms with sixty fathoms of cable in the following position, the Reef Buoy bearing S. by W. distance about four miles, the Barque *Nussar* was South a little below the buoy, the *Faizel Curreem* S. S. E. about the same distance, a moderate breeze sprang up after sun-set from E. S. E. and went round to the southward by 10 P. M. About midnight I was called and found the weather to have a very threatening appearance, to the S. W. the squall came on with such force that I thought the little vessel was going to be blown out of the water altogether, the channel became one heap of breakers, at the same time, my first desire was to slip, but Captain Pollock not liking the idea of loosing the sixty fathoms of chain requested me to remain until daylight; fortunately the little vessel was light and rode without shipping a single sea, it being an ebb-tide, the wind from West to W. S. W. being a-beam, so that we rode without requiring to give her more cable, the only dread we had was of a roller breaking on board of us, which I am happy to say did not occur. At 3-30 A. M. the wind moderated and the sea was not so violent at 7 A. M. on the morning of the 16th with a light air from W. N. W.

W. JACKSON,

*Master.*

No. 4.

I have the honour to inform you, that I received your letter No. 1669 of the 9th instant yesterday, directing me to furnish for the information of the Superintendent of Marine, a statement of the weather and our proceedings on board during the night of Saturday the 15th ultimo.

In reply I beg to state that we experienced no gale of wind on the night mentioned, we were riding with seventy fathoms of cable, in consequence of the heavy swell then running in the channel. I have enclosed an abstract of the log for the 15th and 16th ult.

(Signed)

C. R. REAN.

*Mate in Charge.*

GASPER CHANNEL.  
*An Abstract of the Log of the H. C. F. L. Vessel "Hope," for the 15th and 16th of July, 1848.*

| Date.                                             | Winds and Weather.                                                                                                                                                                                                                                                                                                                                        | Remarks.                                                                                                                                                                                                                                                                              |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Saturday,<br>July 15th, 1848.<br>Barometer 29.40. | A. M. moderate N. N. E. wind and clear weather.<br>4 A. M. ditto winds and cloudy weather.<br>8 A. M. ditto winds and weather.<br>Noon fresh northwarily winds and cloudy weather.<br>4 P. M. ditto winds and cloudy squally weather.<br>8 P. M. moderated eastwardly winds and cloudy weather.<br>Midnight moderate N. N. E. winds and cloudy weather.   | Daylight moderate N. N. E. winds and cloudy weather with a heavy swell.<br><br><br><br><br><br><br>Sun-set fresh N. E. winds and cloudy weather with a heavy swell.                                                                                                                   |
| Sunday,<br>July 16th, 1848.<br>Barometer 29.55.   | A. M. moderate N. N. E. winds and cloudy weather.<br>4 A. M. ditto winds and weather.<br>8 A. M. fresh N. W. wind and squally with showers of rain.<br>Noon fresh W. S. W. winds and cloudy weather.<br>4 P. M. ditto winds and weather.<br>8 P. M. fresh S. W. by S. winds and cloudy squally weather.<br>Midnight fresh S. W. winds and cloudy weather. | Daylight fresh northwarily winds and cloudy weather with a heavy swell.<br><br><br><br><br><br><br>Sun-set fresh S. W. by S. winds and cloudy squally weather with a heavy swell.<br><br><br><br><br><br><br>(Signed) F. DUNCAN, Acting Mate.<br>(Signed) C. R. REAN, Mate in Charge. |

## SHIP FYZUL CURREEM.

*Memorandum of a gale of wind experienced on board the ship "FYZUL CURREEM," Captain BALLANTYNE, from the report of Mr. Master Pilot J. KEYMER, Saturday, July 15th, 1848.*

Daylight weighed in tow of the steamer *Dwarkanath*, fine weather, wind steady and moderate from N. N. E. 6 A. M. set sail, carried four and half fathoms across Auckland Ridge. 7-30 A. M., 9-45 A. M. The ebb-tide made with us off the lower buoys of Lloyd's Channel. 10-45 A. M., wind increasing from North, but weather clear and fine, noon increasing breeze veering round to N. E., Barometer 29.48, 30 P. M. cast off the steamer Reef Buoy W. S. W. lower Floating Light S. S. E. 5-30 P. M. wind falling nearly a calm, and, finding we were loosing ground, brought up in eight fathoms water with the larboard bower anchor, with sixty fathoms cable with the following bearings.

Reef Buoy,..... S. W. by W.  $\frac{1}{2}$  W.

Lower Floating Light vessel, ..... S. S. E.

Megna buoy station ditto, ..... South.

Bark "*Nussur*" at an anchor S. W. by W., *Samarang* (do.) N. N. W.

Reefed topsails and furled sails, 8-30 P. M. light E. N. E. breeze, commenced weighing, but finding it impossible to weigh during the night, the crew being much exhausted and the wind being light from the Eastward, veered out chain again to sixty fathoms, intending to remain till daylight.

11-30 P. M. The wind veered round to the S. W. The sky assumed a very threatening appearance to the Westward and the Barometer falling; midnight increasing breeze from the S. Westward with a fearful cross sea, the vessel rolling and labouring very much, had the greatest difficulty in keeping the coolies below.

*Sunday, 16th July, 1848.*—About 1 A. M. blowing a fearful gale from S. W. b. W. which came up very suddenly and striking the vessel astern, forged her ahead till the cable was taught, when she parted two stoppers that were on abaft the bitts; ran out all the cable on deck, and shortly afterwards parted, the helm was immediately put hard over to port and the vessel wore round with her head to the Southward, the yards braced round on the starboard tack, but owing to the quantity of cable that was out, the ship was quite unmanageable, and drifted to the E. N. Eastward, unfortunately at this moment of peril, few of the crew could be found, the greater

part of the lascars having ran below and otherwise from fear and exhaustion secreted themselves about the vessel, the rest of the crew being unwilling or unable from fear to go aloft, the 2nd officer I believe, and the Serang went aloft and loosed the foresail, the remaining few on deck trying to slip the cable at the seventy-five fathoms shackle. 1-45 A. M. After a very severe and hard task succeeded in setting the foresail, but were obliged to take the tack and sheet to the capstan after it was set, the vessel was still very unmanageable, drifting fast to the Eastward and labouring much, owing to the quantity of cable that was out bringing her up in the wind; found all attempts to start the bolt of the seventy-five fathoms impossible; brought to the messenger and hove in a few links till the sixty fathoms shackle was inside the hawse, after an hour and a half hard work. 2-30 A. M. succeeded in slipping the cable at sixty fathoms. Whilst we were busily engaged on deck unshackling the cable, Mr. McGregor, the chief officer went aloft, and succeeded in loosing the main sail and main topsail. 3 A. M. The wind veered to W. and W. N. W., but more moderate; Barometer 29.11. succeeded in getting aft the main sheet, but not till it was taken to the capstan. We were also obliged to take the topsail sheets and halliards to the capstan, otherwise our exhausted crew could not have set them. 5 A. M. Wind still moderating, set double-reefed fore-topsail, single-reefed main and close-reefed mizen topsails and mizen. Barometer 29.14, wind at this time again veered to the S. W. with the same threatening appearance in the weather. 5-50 A. M. Being out of Pilot's water, Pilot gave over charge to Capt. Ballantyne, requesting him to stand to sea till the weather moderated and protested against his returning, till he had another anchor ready, and his crew were in a more efficient and able state. 6 A. M. sighted the *Megna* buoy station vessel to the S. E. made the signal to be taken out. 7 A. M. I was taken out by her.

The *Fyzul Curreem* made no water throughout the gale, although she shipped an immense quantity of it down the hatches which at times so intimidated the coolies, that they attempted to force their way on deck, but this they were prevented from doing after very strong remonstrance. Had they reached the deck the confusion which they were likely to make, would beyond a doubt have proved fatal to many, if not to us all.

(Signed)

J. KEYMER,  
*Master Pilot.*



## Log of the H. C. F. L. Vessel "Torch."

| Date.                       | Winds and Weather.                                                                                                                    | Vessels in sight.                                | Remarks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Saturday,<br>July 15, 1848. | Brisk N. N. E. and cloudy with rain at A. M.                                                                                          | Day light H. C. P. V. "Megna" at anchor W. N. W. | Day light passing heavy squalls from N. E. to E. with showers of rain.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 29.53 Th. 83                | 4 A. M. ditto variable and ditto.<br>8 A. M. ditto N. to N. E. and ditto with passing showers of rain.                                | Sunset H. C. P. V. "Megna" at anchor W. by N.    | At 11.40 P. M. Breeze increasing at S. W. attended with squalls and light rain, likewise observed the vessel take a sheer with her head to the westward; found the lead edging ahead of the vessel, fast at the same time, being half ebb-tide, being dubious of the vessel driving immediately, let go the Larbd. Bower anchor and commenced veering out cable; breeze increasing to a strong gale and very threatening appearances all round, with a tremendous heavy confused sea on, the sea making a complete break fore and aft. Shewed usual lights for the outer station and hoisted the lantern half mast-head. |
| 29.58 Th. 84                | Noon ditto ditto.                                                                                                                     |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 29.46 Th. 84                | 4 P. M. ditto ditto with distt. thunder.                                                                                              |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 29.36 Th. 84                | 8 P. M. light East and cloudy with lightning.<br>Midnight strong gale at S. W. with threatening appearances all round and light rain. |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Sunday,<br>July 16, 1848.   | A. M. strong S. W. gales with threatening appearances all round and light rain.                                                       | Day light nothing in sight.                      | 0.20 A. M. observed a Barque on our Starboard Quarter standing to the Southward, immediately hoisted the Gaff end light. At 0.30 A. M. vessel shipped                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

a tremendous heavy sea clean over the bows, and filled the decks fore and aft nearly up to the upper rail. At the same time had the main hatches open, giving the vessel more cable, the vessel rolling and pitching very heavy, a great quantity of water went down the main hatch, about 2 feet of water in the between decks and about 4 feet in the hold, commencing baling water out of the between decks and pumping out, at the same time trimming the mast-head Lantern, washed all the lamps on the deck, hen-coops, hatches, &c. adrift on the deck secured the same and after veering out cables, battened down the main hatches, and made all snug; quarter gallery much damaged, the head boards rail and on the starboard anchor 150 fms. and on the larboard with much difficulty 100 fms. 8 A. M. weather clearing up observed the outer Floating Light Buoy, bearing as before North, distant about  $1\frac{1}{2}$  miles. 10.30 A. M. observed a bright spar, with black mast-head, also a chest apparently lashed to it drifting to the Southward with two men on it. 3 P. M. commenced heaving in the larboard cable, vessel riding with the Southward anchor 150 fms. cable, first 12 hours of this day, heavy confused sea on, shipping a great quantity of water and the sea striking under the boats' bottoms.

8 A. M. sighted a barque to the S. E.

1.40 P. M. ditto H. C. P. V. "Magna" South.

4 A. M. ditto W. S. W. and ditto.

8 A. M. breeze moderating at W. S. W. and weather clearing up.

Noon brisk ditto and cloudy.

4 P. M. ditto ditto.

8 P. M. ditto S. W. by S. and clear midnight ditto West and ditto.

29.61 Th. 82

29.61 Th. 84

29.61 Th. 84

*Log of the H. C. F. L. Vessel "Torch"—(Continued.)*

| <i>Date.</i>              | <i>Winds and Weather.</i>                                                                            | <i>Vessels in sight.</i> | <i>Remarks.</i>                                                      |
|---------------------------|------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------------------------------------|
| Monday,<br>July 17, 1848. | A. M. brisk West, and clear.<br>4 A. M. ditto ditto.                                                 | ....                     | Day light brisk W. breezes and cloudy with constant showers of rain. |
| 29.57 Th. 82              | 8 A. M. moderate ditto and cloudy.                                                                   | ....                     | Sunset light South breezes and cloudy weather.                       |
| 29.57 Th. 82              | Noon passing squalls with showers of rain from W. to N. N. W.                                        | ....                     | 7 P. M. hove in cable to 70 fathoms.                                 |
| 29.57 Th. 82              | 4 P. M. light S. W. and cloudy.<br>8 P. M. ditto South and ditto midnight strong W. S. W. and ditto. | ....                     | 8 30 P. M. N. W. with showers of rain.                               |

*H. C. F. L. V. Torch, Kedgerree,*  
*The 27th July, 1848.* }

J. BUNER,  
*Commander.*

I have called this terrific burst of wind a Tornado, more because of its force and limited extent than from any evidence of its being a *turning* gale at all, like the preceding one, but from its having upset one ship and placed others in imminent danger, it evidently approximated closely to the African Tornos and the *Pamperos* of the Rio de la Plata, and is thus part of the meteorological history of our dangerous Sand Heads. We have no reports from any vessel intermediately placed between the Reef Buoy and the Upper Floating Light (a distance of fourteen miles) where no gale was experienced, it is therefore quite possible that there may have been Easterly and N. Easterly gales, at all events during the first burst of the Tornado in this distance. The fall of the Barometer, as shewn by Mr. Ransom's careful table, and the dismal appearance described, were, however, ample warning to make all preparations for bad weather, especially in a position so fraught with danger.

## III.

## CHITTAGONG CYCLONE OF MAY 1849.

In the month of May 1849, the station of Chittagong was visited by a very severe Cyclone, though of small extent, which not only committed great ravages there and on the trading craft in the river, but seems also, and this gives it to us a very high degree of interest, to have passed very slowly over the station, and to have occasioned a very remarkable depression of the Barometer.

I watched this Cyclone with much interest, for its bank of clouds was clearly visible from the terrace of my house in Calcutta for at least two days, and I spared no pains to obtain all the details I could possibly collect by forwarding series of questions to official persons and residents. I have been greatly obliged by the kind attention of those gentlemen who have returned replies to them, I first print the official report of the Master Attendant Capt. Elson who is also Assistant Collector of Customs, abridged in such parts as are unessential to our researches, I have also put in *Italics* some passages which are very remarkable.

TO R. TORRENS, *Esq.*, Commissioner 16th Division, Chittagong.

SIR,—I have the honor to report for your information the circumstances connected with the late hurricane which occurred on the night of Saturday and Sunday morning last the 12th and 13th May, (1849.)



2nd. I premise by saying that during a residence of twenty years in Chittagong, I have seen nothing approaching to it in severity, nor have older residents than myself seen any thing at all to be compared with it since the awful and destructive hurricane of 1824, which deluged the adjoining Islands and the low parts of the district and caused an immense loss of life and property.

3rd. On the 11th, it began to rain steadily, and occasionally it rained heavily, the wind veering from the S. E. to S., the Barometer standing at 29.73; Thermometer at 79° in the shade. There was no indication, however, of any thing more than the setting in of the periodical rains, the usual time for which had passed.\* On the 12th, the clouds were heavy but nothing indicative of any remarkable change. The Barometer had fallen to 29.62½ and Thermometer stood at 80° in the shade. The rain was light and drizzling and at noon, the breezes were moderate from South to S. E. and cloudy weather; at 9 P. M. a strong breeze was succeeded by a severe hurricane with heavy rain, blowing and beating with intense and unabating fury. It commenced at N. W. veered round by the North and N. E. b. East then S. and S. W. and N., again *this species of whirlwind was repeated several times between 9 P. M. on the night of the 12th to 3 A. M. on the morning of the 13th, and did not finally subside till day light of the latter day.* The Barometer† took a range during the hurricane of one and a half inch, but it did not indicate its approach, nor did it fall to any degree noticeable till the hurricane had actually taken us. It is worthy of notice that during this hurricane we had not one clap of thunder nor one flash of lightning but some parties in the station felt the shock of an earthquake, while others thought they saw phosphoric lights emitted from the ground upwards.‡ On the afternoon and night of this day the 13th, there was heavy rain, the country was deluged with water and strewn

\* The weather during the whole of this season having been unsettled with frequent rain, rendered it unlikely that any extraordinary gale should happen at the setting in of the monsoon.

† It fell altogether from 29.62½ to 28.40 its lowest figure during the gale and the hurricane appears to have embraced a portion of the country of about fifty miles in diameter taking the town of Chittagong as its centre.

‡ This report was made previous to my queries being circulated at the station.—H. P.

with wrecks of trees and houses, the most awful thunder and lightning that has been heard for years accompanied this rain, but not much wind. On the morning of the 14th, the same weather continued. The Barometer had risen to 29.62. In the afternoon of the 14th, the weather was fair but cloudy. The Barometer standing at 29.57, still a low figure. On the 16th, Barometer 29.60. Thermometer 83°. Fresh breezes from the South and fair weather.

4th. Having now endeavoured to give you a detailed account of this severe hurricane, I will attempt to relate as far as I have ascertained the damage done to the shipping and the Port generally. The temporary flag-staff has been blown down, one Row boat was blown on shore but no damage of importance done. The Port Master's Schooner "Cygnet" has foundered at her anchors, and one man is lost. When I visited the wreck, I found a large raft of timber foul of it, what share this had in sending her to the bottom, I cannot say; the people on board of the Schooner appear to have been so desperately affrighted, that they can give no account of themselves nor of any thing else. Intercourse with the shore was perfectly out of the question. For the reasons stated in my separate letter I fear the Schooner is irrecoverably lost.

5th. The buoys at the river's mouth have withstood the gale.

6th. The Pier at the ghat has been nearly destroyed partly by vessels running against it, and partly by the force of the wind and sea; a portion of it is standing in the river, separated from the main road, the intermediate space having given way. A great part of the revetment erected for the protection of the salt golahs has been destroyed and the salt golahs themselves exhibit a sorry spectacle of what they have suffered. The losses in this department are currently estimated by lacks, not in thousands of rupees. The shipping community have suffered most severely, 22 vessels have sunk at their anchors and 44 vessels have been cast on the shore, many of them so severely damaged, as to render their recovery useless even when recoverable. On the whole there never has been perhaps such a fatal season to the shipping at this Port, and whether I look at the shipping or the shore, the ravages of the desolating elements are alike every where apparent.

7th. This I feel to be a very inadequate description of the mis-

chief and distress occasioned by the late storm, and I much fear that a great deal remains still to be told. I have no account as yet from the Light House.

8th. I annex a statement of the casualties in vessels as far as I have yet ascertained.

Sd. F. J. A. ELSON,

*Port Master and Asstt. Collector of Sea Customs.*

*Port Office, Chittagong, the 17th May, 1849.*

The following are the replies to my queries, the query being in Italics and the Antique letters **E.** &c. standing for the names of the following gentlemen, viz.

**E.** F. J. A. Elson, Esq.

**J. R. B.** J. R. Bedford, Esq. M. D.

**B.** O. T. Buckland, Esq. C. S.

**M.** J. Maxwell, Esq.

**T.** R. Trotter, Esq. C. S.

**R. I.** Robt. Ince, Esq. Salt Dept.

QUERY—No. 1.

*Please to state how the wind began to blow, how it continued to blow and veer, and how it ended, as near as you recollect.*

**Elson.** See his report above for this reply.

**J. R. Bedford, Buckland.** On the 12th May the sun set in a stormy sky. The wind blew freshly all the evening and became a decided gale; at 11 P. M. blowing from N. N. E.; at 12 P. M. it came due East and at 2 A. M. S. E. this was the height of the hurricane. It now slightly abating veered round the South and subsequently to S. W. finally blowing itself out in gusts from N. W. at 4 A. M.

**Maxwell.** I agree to what Dr. Bedford has said except about the setting of the sun, I do not think it had been seen for two days, and I do not recollect any stormy appearance in the sky. We had had much rain on the 11th and 12th.

**Trotter.** About North; it veered Easterly and ended about S. E. Southerly.

N. B.—Notes to this from Mr. Ince and Mr. J. Maxwell intimate that they think Mr. Trotter has mistaken the direction of the wind.



## No. 2.

*When was it at the highest, and how long did the extreme fury of it last?*

**E.** At 2.30 A. M. it was at its height, but several houses had been unroofed prior to that hour.

**J. R. B.** It was at the highest at from 2 to 3 A. M. the extreme fury lasting about one hour.

**B.** My house suffered most before 2 A. M.

**M.** At its highest from 12.30 to 2.30 it blew furiously the whole time.

## No. 3.

*Did it veer oftener than once while it was heaviest, or was it steady then at one point?*

**E.** It struck me that the wind veered right round more than once, and was never steady except at the S. E. point, from which it always blew with great fury.

**J. R. B.** During the height of the hurricane, it appeared to veer slowly and steadily from S. E. to South.

**M.** It blew from the East for one hour and then veered partially.

## No. 4.

*Were the changes veerings or shiftings, that is, gradual or sudden?*

**E.** I think in some cases sudden, but not from one point to its directly opposite point at once.

**J. R. B.** Veering I believe throughout.

**B.** Gradual. **M.** Gradual.

## No. 5.

*Was there any interval of calm when at the highest?*

**E.** None. **M.** No.

**J. R. B.** I believe not.

**B.** One native report sent to me from Raojun\* mentioned that the storm ceased for about half an hour there soon after midnight, and then began again; but the writer of this report was not at Raojun during the storm; he heard this from the members of his family there when he went to see them a few days afterwards.

\* Thirteen miles N. 42° East from the station of Chittagong by the Revenue Survey map, as reduced for Rushton's Directory.



## No. 6.

*Was there any lightning that you observed, and at what periods of the hurricane?*

**E.** Not a flash or clap of thunder but rain in torrents.

**J. R. B.** I looked out repeatedly during the gales and saw no lightning. There was a distant rumbling of thunder about 4 A. M. of the 13th.

**M.** No. I was on the look out the whole time.

## No. 7.

*Was there any kind of remarkable light like that of phosphorus, or an oiled paper screen?*

**E.** There were two persons in the station, on a hill in the neighbourhood, who thought they saw phosphoric lights glancing or playing about the ground.

**B.** It was not easy to look out on account of the dirt from the broken verandahs and rubbish that was driving about, but I saw no light except that of the moon which though invisible itself, cast a faint light on the driving clouds.

**M.** Yes: The sky had a decidedly luminous appearance much more than could be expected to arise from the moon at its last quarter.

## No. 8.

*Did you see or hear of any one who saw flashes or streams of lightning proceeding upwards from the earth to the clouds?*

**E.** See reply to No. 7.

**J. R. B.** The Rev. Mr. Johannes and his son-in-law Mr. Roberts of the Abkarry Department assert that they saw fire streaming along the surface of a closely neighbouring hill on two or three occasions during the night.

**B.** There was a large Bolam boat burnt during the storm close to Mr. Johannes' house.

**M.** I saw nothing of the burning of boats or houses.

**R. I.** Nothing of this kind that I saw; the night was *strangely* bright. I could perceive almost every object outside: perhaps the most extraordinary feature in this storm was, that we had neither thunder nor lightning.

## No. 9.

*Were any fire-balls or sparks noticed?*

**E.** None that I saw or heard of.

**M.** None except from the boats and houses referred to.

## No. 10.

*Was there any thing which appear like flashes or gleams of light in the vacuum of the tube of the Barometer noticed?*

**E.** I think not. I had my barometer before me all the time. I took it down at first, as I thought my house was coming down, and on putting it up was surprised to find it had fallen to such a low figure and was still falling.

No other replies are given to this query.

## No. 11.

*What do you take to have been the greatest rise of the river above low water mark, and at what time did it reach this?*

**E.** The moon on the 12th was 28 days old nearly, and consequently it was a neap-tide: Indeed almost the lowest tide. Yet my row-boat was blown up so high on shore, that I could not find her off without digging her out, even on the next highest spring-tide; I should say the rise of water was at least 18 feet. Fifteen feet is the ordinary rise of high spring-tide here.

**M.** I should say 18 or 20 feet.

**R. I.** Not less, I should be disposed to think. Such was the force of the storm, that at the Sudder Ghat a vessel of 4,500 maunds (150 tons) was thrown nearly on the road.

## No. 12.

*Was the rise a gradual or a sudden one, and did any wave or bore come in when the sudden rise took place?*

No replies.

## No. 13.

*Please to add any other remarks or details which may occur to you. Say such as indicate the great force of the wind or the like.*

**E.** The force of the wind was equal to any hurricane I ever saw at sea off the Mauritius. It blew down the spire of the church, the balustrades of houses and trees of all kinds, and left the town in a fearful state of desolation. All the fallen trees, at least the large trees, lie in a S. E. and N. W. line, their heads to the N. W. plainly indicating the quarter from which the severity of the hur-

ricane came. An open Tonjohn\* was blown out of my verandah with a man in it and another trying to hold it; in fact a man could not keep his legs at one time. Iron staples were drawn and glass doors forced in. All my out offices were unroofed, and so were those nearly of every body else. The river and its banks were strewed with 66 wrecks whole or partial; *all square-rigged vessels.*

Register of Barometer.

| <i>Before.</i>      | <i>After.</i>  |
|---------------------|----------------|
| May 10th—29.80      | May 13th—29.62 |
| „ 11th—29.73        | „ 14th—29.66   |
| „ 12th—29.66        | „ 15th—29.60   |
| During the gale,    |                |
|                     | <i>Bar.</i>    |
| May 13th—1.30 A. M. | 28.77          |
| „ 2.30 „            | 28.44          |
| „ 2.45 „            | 28.40          |
| „ 2.50 „            | 28.48          |
| „ 2.55 „            | 28.60          |
| „ 2.60 „            | 28.67          |
| „ 3.30 „            | 28.90          |
| „ 3.35 „            | 29.06          |
| „ 4.0 „             | 29.20          |
| „ 4.30 „            | 29.26          |
| „ 5. „              | 29.46          |
| „ 10. „             | 29.62          |

The lowest figure of the Barometer indicates the most severe period of the hurricane, as it happened to us: the gale was severe for seven hours, viz. from 9 P. M. of the 12th to 4 A. M. of the 13th.

**J. R. B.** See the observations of Captain Elson for the Bar.

**M.** The force of the wind was so great, that a servant of mine was blown over in endeavouring to reach my cook-room.

**B.** The fallen trees lay chiefly pointing from S. E. to N. W. thus indicating the point at which the wind was most violent.

No. 14.

*Did you or any person to your knowledge experience any shock of an earthquake, and at what time?*

**E.** I experienced no shock of an earthquake, and should say that in such a turmoil of noise, confusion, and wreck, and storm, it would

\* Tonjohn, an open or close sedan chair.

require a very nice observer to recognise the shock of an earthquake, unless very severe ; but Capt. Maxwell says he felt one. I fully expected my house to come down, as there was one next to me roofless and the tenant, Lieut. Hutchison, his wife and child in a stable, and they could not even walk over to my house, not fifty yards across.

**J. R. B.** One or two residents in the station imagined they felt an earthquake ; but I was awake during the whole night and was conscious of nothing of the kind.

**M.** At 5 minutes to 2 A. M. I distinctly felt an earthquake, and so did Mr. Maxwell : I cannot be mistaken.

**R. T.** I felt something like it about that time, as the doors and even the walls appeared to shake.

The following are abridgments of newspaper accounts which appeared shortly after this Cyclone in the *Calcutta Englishman*.

The weather has been so very unusual here, that many persons supposed a hurricane had occurred at the Sandheads. Reports from that quarter, however, mentioned remarkably fine weather for the season, and we were beginning to think that all was well, when we found by the subjoined letter from a gentleman on whom we can fully rely, that the gale had visited another quarter, and it is to be feared that it has extended to the coast of Arracan :—

“ *Chittagong, Monday, 14th May.*

“ On Saturday night Chittagong was visited by a tremendous storm or hurricane, of which I beg to give you the following account, in the hope that it may be interesting to you and your readers.

“ During the evening of Saturday, the 12th instant, heavy rain fell, accompanied by strong wind, which increased in violence about 11 P. M., and from midnight to 3 A. M. on Sunday morning it blew a furious gale, with all the violence of one of Mr. Piddington’s Cyclones or a West India Hurricane.

“ At first the wind came from the North-East, but it gradually worked round to the South, being most violent when about at South-East, and afterwards slowly diminishing its strength and fury as it came round to the North-West, at which point it gradually subsided into an ordinary breeze.

“ Such a storm has not been known at Chittagong since the year 1824. Its effects have been terrible, and though Government is



perhaps the greatest loser, it must cause an immense amount of individual suffering, for I really cannot see a native house or shed in the town which has not been either thrown down or considerably damaged. There has not yet been time to ascertain the extent of damage done in the Mofussil. As far as I can make out from accounts yet received, the storm came down from the East, and went away towards the North, if this is not inconsistent with its having gone off when blowing from the North-West. I hear from the Magistrate, that every police station to the North and East of the town as far as the Fenny River has been utterly destroyed. The storm seems also to have extended, but with less violence, fifteen or twenty miles South of the Town; but I have not been able to obtain any accounts yet from places situated still further to the South, and hope that they have escaped.

“The pukka (brick) houses of the residents, which are all built on the tops of little hills, have suffered as might be expected from their exposed position. Most of them were once surrounded by thatched verandahs; but now not one can boast of a stick of verandah remaining. The walls seem to have stood in most of the pukka houses, but doors, windows, venetians, and even brick parapets have all been terribly damaged. Bungalows with their sloping roofs have suffered most, several have been quite unroofed, and some utterly thrown down. Stables and out-houses of all descriptions were overthrown, and in several, valuable horses were dug out from among the ruins; but luckily uninjured, through some wonderful good fortune. Three out of the four pinnacles adorning the Church tower were also blown down.

“But the greatest damage was done to the shipping in the river. The jetty at the Sudder ghât has been half broken down, and a great sloop now lies between it and the shore, with its masts stretching across the road. A few yards further down, there are seven sloops all driven against the bank together in one smash. One I saw, with the fiddle heads of two others broken off into its stern. A little further down, there is another party of four sloops driven ashore in similar ruin and confusion. Four other sloops have sunk in the middle of the river; and the Government schooner, the *Cygnets*, went down at her anchorage, with one of her crew on board, her topmasts only being now visible.

“The fury of the wind broke up the thatched roofs of the Government Salt Golahs, and the rain which fell early on Sunday morning did considerable damage to the salt. But all last night and this morning it has rained again furiously, and I am told that the damage done to the salt is now estimated at about 5 (five) lakhs of rupees. The prisoners, and the few coolies that can be found, are now employed patching up the roofs, in case the rain should come on again.”

The following extract of a letter from Chittagong, is dated the 20th instant, and gives some further particulars of the late hurricane:—

“Since my last letter to you, I have been endeavouring to obtain more correct and accurate information, as to the course and extent of the hurricane, which visited Chittagong on the morning of the 13th instant.

“There are only native accounts to be procured of what happened in the Mofussil, but these are quite unanimous in the opinion that the storm came down from the East, and passed over to the South-West. I do not know whether these storms, when on land, are at all guided by the course of rivers, but this storm seems to have come down with its centre along the Kurnafoollah or Chittagong river, which flows towards the sea with a general direction from about ‘East by North’ to ‘West by South.’ It seems that the greatest violence of the storm was felt along the North bank of the river. It extended about twenty-five miles to the North of the Chittagong river and town; the peak of the Seetacoond Hill being its Northern limit. But to the South of the river it was not so violent, although it was felt as far as Sathanya, or full thirty miles from the town of Chittagong. This would give the storm a diameter of about fifty miles.

“I fully expect to hear that it has reached the Madras coast, for yesterday I saw the log of the Yacht *Mystery*, which was caught and dismasted in a hurricane at 3 A. M., on the 13th instant, in N. Lat. 17°, and E. Long. 88°.

“The *Mystery* was on her passage from Madras to Dacca, and put into this port in consequence of the damage sustained in the storm. The Captain told me that the wind seemed to blow from

all sides at once, but that it came on from the North-East, and gradually went off, blowing from the North-West. The time and the direction of the storm seem clearly to point out that this was the Chittagong storm, and at that rate of progress it may have reached Madras or Ceylon about 5 A. M.

“Several lives were lost here, by the falling of the native huts and trees. Three women and two children were killed in one hut, on which a huge tree fell. I have also heard of the deaths of seven men in different places, through injuries received during the storm. A sloop with 180 passengers from Akyab is said to have gone down at the mouth of the river, and only five people were saved.

“I have not been able to find out that any owner of a barometer observed any previous indication of the coming storm. The appearance of the sky did not foretell anything unusual.

“We have had heavy rain, with thunder, lightning, and sharp squalls of wind every day since the 13th, especially at night, to the great discomfort of the poor houseless natives. On the morning of the 14th seven inches of rain fell; and I should think ten inches a moderate computation for the remaining quantity that has fallen during the week. This rain has of course added to the injury done to the Company's salt, for it was utterly impossible to repair the damage done by the hurricane to the thatch of the Golahs, so as to exclude it effectually. But I believe that the total damage sustained in the Salt Department is about four lakhs of Rupees instead of five as previously stated.”

The following is an official report by E. Lautour, Esq. C. S. Deputy Collector; from Bullooah Lat.  $22^{\circ} 52'$  N. ; Long.  $90^{\circ} 44'$  East; sixty-eight miles N. and sixty-three W. from Chittagong.

“On the night of the 12th, we had moderate gale from E. N. E. to E. S. E.

2nd. Rain per guage at elevation of 4 feet 1.25.

Thermometer at day-light  $78^{\circ}$ .

Height of the gale 1 A. M. to 3 A. M.

3rd. There was every appearance of a heavy gale on the previous day, and it appears to have visited Chittagong with extreme violence on that night, and to have done very extensive mischief.

4th. With us however the gale was not more than moderate and



I conclude that Noacolly\* may be considered the edge of the storm in this direction."

I conclude the shore observations with the following which are my notes as taken at Calcutta, from which the station of Chittagong it will be recollected, bears S.  $87^{\circ}$  E. distance 210 miles.

*Observations at Calcutta.*

*May 12th, 1849.*—Barometer has been gradually falling; with Easterly and N. Easterly breezes *for the last two or three days*. In the morning dark nimbus and strato-nimbus to the East breaking and flying low and in detached portions across a blue sky with strata above. In the day, heavy white and bluish-gray cumuli with a dense white haze and strata above; very little blue sky. *At night stars very bright and seen at very low altitudes.*

On this day (12th) blowing fresh at Noon in squalls from N. E. with a very little drizzling rain.

$\frac{1}{2}$  past 6 p. m. Bar. 29.60; Simp. 29.64; Ther.  $84\frac{1}{2}^{\circ}$ .

Light breeze N. N. E. From the North to East, and round nearly to South, a dark heavy bank of strato-nimbus. To the Westward dark cumulo-strata below, and a blue sky with white strata above. At 8 p. m. calm. Bar. 29.59; Simp. 29.56; Ther.  $84^{\circ}$ .

*May 13th.*—6h. 15 a. m. Bar. 29.60; Simp. 29.65; Ther.  $82\frac{1}{2}^{\circ}$ . Calm. Thick bank *to S. and S. East*, clear to the East, dark strata and cirro-strata scattered about.

10h. 30 a. m. Bar. 29.59; Simp. 29.68; Ther.  $84^{\circ}$ . Calm. Light gauzy haze, and white loose cumuli. At  $11\frac{1}{2}$  a. m. Bar. 29.62; Simp. 29.66; Ther.  $84^{\circ}$ . Calm. A broad *white* bank to the S. E. with numerous little strato-cumuli, gauzy fleecy haze and cumuli above. Light airs from the Westward. At  $\frac{1}{2}$  past Noon Bar. 29.60; Simp. 29.65; Ther.  $84^{\circ}$ . At  $6\frac{1}{4}$  p. m. Bar. 29.57; Simp. 29.62; Ther.  $85\frac{1}{2}^{\circ}$ .

*May 14th.*—Calm, oppressive night; Bar. 29.55; Simp. 29.66; Ther.  $85\frac{1}{4}^{\circ}$ . Light stationary white cumuli. To the S. East, light white and grey strata and hazy.

The following are the Barometer observations at the Surveyor General's Office for these days. Corrected, it will be observed, to  $32^{\circ}$  Faht. whereas all the others are without correction for Temperature.

\* Noacolly,  $5\frac{1}{2}$  miles to the N. East of the Collector's house.



Barometer and Thermometer as registered at the Surveyor General's Office, Calcutta. N. B. Bar. Corrd. to 32° Fahr.

| Date.                | Sunrise. |       | At 9h. 50' A.M. |       | Appt. Noon. |       | At 2h. 40' P.M. |       | At 4h. 0 P. M. |       | At Sunset. |       |
|----------------------|----------|-------|-----------------|-------|-------------|-------|-----------------|-------|----------------|-------|------------|-------|
|                      | Bar.     | Ther. | Bar.            | Ther. | Bar.        | Ther. | Bar.            | Ther. | Bar.           | Ther. | Bar.       | Ther. |
| 1849<br>May<br>11th, | 29.651   | 77.3  | 29.773          | 86.7  | 29.689      | 89.3  | 29.588          | 91.1  | 29.564         | 90.6  | 29.599     | 87.0  |
| 12th,                | .559     | 78.8  | .588            | 83.7  | .547        | 83.7  | .487            | 86.7  | .459           | 87.0  | .478       | 85.6  |
| 13th,                | .510     | 77.8  | .564            | 88.6  | .524        | 92.0  | .440            | 94.7  | .428           | 94.2  | .451       | 91.7  |
| 14th,                | .489     | 83.8  | .532            | 93.0  | .490        | 95.7  | .404            | 97.8  | .354           | 96.3  | .488       | 86.0  |
| 15th,                | .523     | 80.2  | .562            | 89.6  | .537        | 92.8  | .475            | 93.9  | .445           | 92.3  | .479       | 88.3  |

Connected with the foregoing, and before giving the few sea logs in the Bay which I have been able to obtain, is the following capital account of the weather at the Sand Heads and between the South Channel and Kedgerree, for which I am obliged to Mr. Master Pilot F. Barlow of the H. C. P. V. *Salween*.

The *Salween's* Barometer from the 6th to the 9th May stood between 29.97 and 29.82 at 4 P. M. on the 9th May.

On the 10th May it was at 10 A. M. at 29.86; and at 4 P. M. at 29.79. Winds light E. S. E. to S. East and light rain at times. Mr. Barlow's observations commence regularly on the 11th, arranged nearly as in the following table, which is copied from the note-book, he was good enough to place at my disposal.



H. C. P. V. Salween, Saturday, 12th May, 1849.

| Date. | Hour.     | Wind.               | Force. | Clouds.                                          | Scud from. | Swell from.        | Clear sky visible.      | Bar. A. | Bar. B.* | Ther. | Remarks.                                                                                                                                                                                                                                                                        |
|-------|-----------|---------------------|--------|--------------------------------------------------|------------|--------------------|-------------------------|---------|----------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. M. | 1         | East.               |        |                                                  |            |                    |                         |         |          |       |                                                                                                                                                                                                                                                                                 |
|       | 2         | E. b. N.            |        |                                                  |            |                    |                         |         |          |       |                                                                                                                                                                                                                                                                                 |
|       | 3         | N. E.               |        |                                                  |            |                    |                         |         |          |       |                                                                                                                                                                                                                                                                                 |
|       | 4         | —                   | 5      | Cum; nimb.                                       | —          | —                  | Zenith Patches to West. | 29.70   |          |       | Cloudy.                                                                                                                                                                                                                                                                         |
|       | 5         | —                   | —      | —                                                | —          | —                  | —                       | .66     |          |       | Wind moaning very much "Sylph" in sight S. W.                                                                                                                                                                                                                                   |
|       | 6         | N. N. E.            | —      | —                                                | N. E.      | N. West.           | —                       | .66     |          |       | A few portions of horizon to Westward clear but dense strata from 50° to 30° of alt. Clouds piled in strata, current about 1 knot to Westward.                                                                                                                                  |
|       | 7         | N.                  | 6      | Cum: a thick lining all round most to E. & S. E. | N. N. E.   | —                  | —                       | .66     |          |       | A dense bank of dark blue (lead colour?) from E. N. E. to S. E.                                                                                                                                                                                                                 |
| Noon. | 8         | N. $\frac{1}{2}$ W. | 6      | ..                                               | N.         | —                  | Very little.            | .66     |          |       |                                                                                                                                                                                                                                                                                 |
|       | 9         | N. $\frac{3}{4}$ E. | 7      | ..                                               | N.         | —                  | —                       | .65     | 29.53    |       | 10. Took charge of Sylph. Cirro-strata all round in a horse-shoe, but clear S. to S. b. E. Very heavy (clouds) ? rising and falling E. N. E. to S. clear to N. W. cum; strata overhead F. L. V., S. W. b. S. 6 miles in $8\frac{1}{2}$ fs. on East reef; heavy rain to E. S. E. |
|       | 10        | N. b. W.            | 8      | Cum: strata Heavy cum; Do.                       | N.         | —                  | —                       | .60     | .50      |       |                                                                                                                                                                                                                                                                                 |
|       | 11        | N. $\frac{1}{2}$ W. | 8      | —                                                | —          | S. E.              | None.                   | .60     | .50      |       |                                                                                                                                                                                                                                                                                 |
|       | 12 North. | —                   | 3      | —                                                | —          | —                  | —                       |         |          |       |                                                                                                                                                                                                                                                                                 |
| P. M. | 1         | N. N. E.            | 7      | Do.                                              | —          | —                  | —                       | .58     | .48      | 86°   | Heavy rain squalls to S. E. rising to N. W. and expanding themselves. West.                                                                                                                                                                                                     |
|       | 2         | N. b. W.            | 7      | Do.                                              | N.         | E. S. E. to South. | —                       | .55     | .45      | 84    | Reefed topsails, much light rain to N. E. East to S. E.                                                                                                                                                                                                                         |
|       | 3         | N. N. W.            | 5      | Cum:                                             | N.         | East south.        | —                       | .53     | .43      | 84    | Light showers finer.                                                                                                                                                                                                                                                            |
|       | 4         | N. N. W.            | 5      | Do.                                              | N.         | S. E.              | —                       | .54     | .42      | 84    | Very heavy rain to N. W. wifful wind.                                                                                                                                                                                                                                           |
|       | 5         | —                   | 5      | —                                                | N. N. E.   | Do.                | —                       | .55     | .42      | 84    | Squally app. to S. East S. and N. W. Hard strata, of clouds to N. N. E.                                                                                                                                                                                                         |
|       | 6         | N. b. E.            | 3      | —                                                | —          | Do.                | W. S. W. to             | .55     | .42      | 84    | Beautifully clear W. S. W. and N. W. nimb: and cum: strati to N. E. S. E. and South.                                                                                                                                                                                            |
|       | 7         | —                   | 4      | —                                                | North.     | do. light.         | N. W.                   | .58     | .47      | 84    | Clear as if by magic from W. to N. and N. E.                                                                                                                                                                                                                                    |

\* B. Is a Bar. of the Clipper Sylph; another was found to correspond exactly with that of the Salween and so is continued in the same column, A as the Salween's after 9 A. M. when Mr. Barlow took charge of the Sylph.

## 12th May—Continued.

|           |    |                        |   |                           |                |          |                                       |       |       |     |                                                                              |
|-----------|----|------------------------|---|---------------------------|----------------|----------|---------------------------------------|-------|-------|-----|------------------------------------------------------------------------------|
| A. M.     | 8  | N. N. W.               | 4 | Cum :                     | —              | None.    | A few clouds<br>N. E. to ze-<br>nith. | .61   | .48   | 84  | Lightning S. W. cloudy to W. S. W. and N. W.                                 |
|           | 9  | N. b. W.               | 4 | Light cum :               | None.          | —        | —                                     | .61   | .48   | 83  | Ditto ditto hazy to N. fine weather.                                         |
|           | 10 | —                      | 3 | —                         | —              | —        | —                                     | .61   | .48   | 83  | Evidently a current setting to the Westward.                                 |
|           | 11 | N. b. W. &<br>N. b. E. | 3 | —                         | —              | —        | Zenith.                               | .62   | .49   | 83  | Lower floating light Vessel S. S. E. 5 miles.                                |
|           | 12 | —                      | — | ..                        | ..             | ..       | —                                     | .62   | .51   | 83  | Lightning S. E. to S. W. but sinking. Fine else-<br>where.                   |
|           | 1  | W. N. W.               | 2 | to S. W.                  | N. W.          | S. W.    | All but S. E.<br>to S. W.             | —     | —     | —   | Very fair to Northward but a slow scud from<br>N. W. water smooth.           |
|           | 2  | N. W. b.<br>W.         | 2 | Cum : strati<br>and nimb. | —              | —        | —                                     | 29.60 | 29.50 | —   | —                                                                            |
|           | 3  | —                      | 1 | —                         | N. W.<br>slow. | Southwd. | —                                     | —     | —     | —   | Cirro-cum : and Nimb : to S. W. and S. E. but<br>fine everywhere else.       |
|           | 4  | —                      | — | —                         | —              | —        | —                                     | —     | —     | —   | Heavy swell on Eastern reef but comparatively<br>smooth in the channel.      |
|           | 5  | —                      | — | —                         | —              | —        | —                                     | —     | —     | —   | —                                                                            |
|           | 6  | —                      | — | —                         | —              | —        | —                                     | —     | —     | —   | —                                                                            |
| MAY 13TH. | 7  | —                      | — | —                         | —              | —        | —                                     | —     | —     | —   | —                                                                            |
|           | 8  | N. N. W.               | 1 | Cirro-strati.             | Noon.          | S. S. E. | Zenith.                               | .65   | .55   | 85° | Light strata to N. W. East and S. E.                                         |
| Noon.     | 9  | —                      | — | —                         | —              | —        | —                                     | —     | —     | —   | Frightful breakers on Saugor Island and on<br>Eastern reef at the Spit Buoy. |
|           | 10 | —                      | — | —                         | —              | —        | —                                     | —     | —     | —   | —                                                                            |
|           | 11 | —                      | — | Cirro-strati<br>to N. E.  | —              | —        | —                                     | .65   | —     | 86  | Calm ; appearance of a breeze S. W.                                          |
|           | 12 | —                      | — | —                         | —              | S. S. E. | all.                                  | .65   | .55   | —   | Calm. Off upper floating light.                                              |
| P. M.     | 1  | —                      | — | —                         | —              | —        | —                                     | —     | .50   | —   | —                                                                            |
|           | 2  | —                      | — | —                         | —              | —        | —                                     | —     | .54   | 87  | —                                                                            |
|           | 3  | S. W.                  | — | Clear.                    | —              | —        | all.                                  | .65   | .54   | 87  | —                                                                            |

In Saugor Roads running for Kedgerree ; fine and clear, but the usual S. W. monsoon haze.



We have no evidence that this Cyclone was at all felt at sea, for it was on the night of the 12th and 13th May that it visited Chittagong and its track was evidently from the N.  $42^{\circ}$  East to the S.  $42^{\circ}$  W. or out to sea; while the Brig *Colonel Burney* Capt. Crisp, whose note I shall add, was at the centre of a small Cyclone on the night of the 11th and 12th May at a distance of about 300 miles to the S. W. of Chittagong, so that if this little Cyclone had been the same which passed over Chittagong, it would have commenced there at South or S. E. and ended at N. W. or exactly contrary to the changes which took place there. The Calcutta newspaper letter, p. 25, mentions the dismasting of the Yacht *Mystery* in a Cyclone at 400 miles to the S. W. of Chittagong; at 3 A. M. of the 13th when the Cyclone was still raging at the station. Hence it is unnecessary to discuss whether it was the same. It was probably a small one of the same kind, but her Log has not reached me, I regret to say.

The ship *Sir Robert Seppings* had also on the 11th and 12th May while running up the Coast and abreast of Coringa, on the 12th some unsettled weather for which proper precautions were taken, but there is nothing in her log worth occupying our space.

The H. C. Surveying Brig *Krishna*, Lt. Fell, was also running up from off Cape Negrais on the 12th, to the light vessel on the 15th, but she carried a fresh monsoon, giving her from 5 to 7 and 8 knots the whole way, though with squally unsettled weather and her Barometer at 5 P. M., on the 14th at 29.59, when the remarks are as follows:

“Moderate breeze with a very hazy, damp sultry atmosphere; clouds very unsettled to the Westward, working to the Southward and again passing to the North *in circles*. At 11h. 20 P. M. wind suddenly shifted to the North with a short interval of calm then to the N. N. E. with a hard squall and rain.”

This occurred when the vessel was at about 225 miles to the S. W. b. W. of Chittagong and forty-three hours after the centre of the Chittagong Cyclone had passed over that station, so that if it was, *as it might have been*, for I do not pretend to say that *it was* so, the disk of that Cyclone which had lifted up and travelled onwards without descending, it had progressed at about five miles per hour, a slow rate, which however agrees well enough with its

almost stationary character at Chittagong. We have abundant proof that Cyclones descend; and some that they *ascend*, and are seen overhead after a certain progress at sea and on shore; but this amounts to but little more than a supposition, though it is not one to be omitted.

The following is the note of the "*Colonel Burney's*" log forwarded to me by Capt. Crisp, who unfortunately had no Barometer on board.

*Extract from the "Colonel Burney's" Log.*

May 11th, 1849.—In Latitude  $17^{\circ} 51'$  N. and Long.  $88^{\circ} 16'$  East; wind at E. S. E. with high sea from the Southward; at sunset, hard gales; hove to, with head to the Southward; at 11 P. M. wind suddenly shifted from East to North (yet the high sea running high from South); midnight shifted with a sudden gust to West, and blew with great violence until 3 A. M. of the 12th, when it shifted to S. W. and continued to blow in hard gales until 4 A. M. of the 13th, when the gale abated. Just before the gale abated, experienced very heavy peals of thunder attended with lightning and heavy rain; "at 8 A. M. strong breezes wind" shifted to North; at 2 P. M. wind shifted to S. W. steady breezes and sea subsiding.

The three days previous to the gale had nothing but calms, during which time we experienced a set to the Westward of fifteen miles per day, whereas during the gale we were set seventy miles to the Eastward.

*Remarks.*

It adds much interest to this remarkable Cyclone that it occurred at a spot like Chittagong, which is itself probably an extinct volcanic site, and situated at the extremity of the great volcanic band of the Pacific Ocean and Eastern Archipelago. The last severe earthquake on record there is that of April, 1762 (Philosophical Transactions, Vol. LIII. pp. 252 to 259) and it is added in the last of the accounts there given, that two volcanoes had "broken out." No gale seems to have accompanied this event.

I can find no newspaper record of the hurricane of 1824, alluded to in Capt. Elson's report, and in reply to a reference to that gentleman, he says:—

"On enquiry amongst the public offices, I find at the Salt Board a

letter of which Mr. Grote, C. S. the Secretary has obliged me with a copy, that on the 14th June a hurricane at South had been blowing for eight hours consecutively, but the report is not continued on the following days, or rather the documents have disappeared."

We are thus confined to the reports from Chittagong itself with regard to this singular Cyclone of 1849, and it will be I think convenient to divide our remarks under the following different heads.

1. Extent of the Cyclone.
2. Its track and rate of travelling.
3. Barometrical observations.
4. Other phenomena before, and during its continuance.

#### 1.—*Extent of the Cyclone.*

It seems to have been pretty well ascertained at Chittagong that the diameter of the more violent and decided part of this Cyclone was not much above fifty miles in diameter, Sathaneah, thirty miles to the South of the station is given as the limit of where it was "*felt*" in that direction, and the same writer (see newspaper extract) states that he "heard from the Magistrate that every Police station as far North as the Fenny River\* has been destroyed." The Police stations are generally stout, well-built bungalows, but not of brick but which take a heavy gale to destroy them, being moreover, usually, in sheltered situations. The Fenny River mouth is thirty-five miles N. N. W. from the station of Chittagong, and at Bulloah, sixty-eight miles to the N. W. b. W. we have European testimony that it was "not more than moderate" so that we may suppose, fairly, that the limit of the really violent part of the meteor did not exceed sixty miles, of which size I shall assume it to have been.

#### 2.—*The Track and rate of travelling of the Cyclone.*

It is difficult to assign a track to this Cyclone as we usually do, for Captain Elson's account; and he is an old Sailor and most likely to be correct in his estimates of the direction of the wind would almost lead us to believe that the Cyclone *descended* upon or was formed at Chittagong, where it spent its fury, but the native report mentioned by Mr. Buckland (Replies to query No. 5) of an interval of calm, is I think entitled to full credit, because it was a circumstance

\* The boundary of the district of Chittagong to the North.



which would much strike the terrified members of a native or even a European family, the head of which was absent while the house was blowing to pieces in a hurricane; and it is one which moreover they were not at all likely to have invented.

As *Raojan*, then, bears N.  $42^{\circ}$  East, distant thirteen miles from the station of Chittagong, we must in the absence of any better data take it that the Cyclone came down if not in this exact track, yet on one not far removed from it, and was slowly passing over Chittagong from 9 P. M. to daylight or say for 9 hours which for a diameter of sixty miles would give 6.6 miles *per* hour for its rate of travelling, and we have no reason to doubt, considering the gradual though excessive fall and subsequent rise of the Barometer, and the veering of the wind as in all cases of progressive Cyclones, that it *was* slowly passing. The great discrepancies in the opinions of the residents as to the direction of the wind, and even perhaps Capt. Elson's impression of its having gone round more than once, may I think be accounted for, partly by supposing that there were, especially in the severe gusts, excessive *incurvings* of the wind, and partly by considering that the station of Chittagong is described for the most part as a collection of bungalows and houses on small hills; and from the Revenue Survey map it appears to occupy a space of about a mile or a mile and a half in breadth, and about three miles in length from N. N. W. to S. S. E. on a sort of ridge of hills in that direction, so that a Cyclone crossing the station from the E. N. E. would do so at right angles; and thus the mere surface wind would be subjected from the nature of the ground alone, apart from its own incurvings, to infinite irregularities; and the whole occurring at night and the observers in houses apparently on the point of being blown to pieces, would render it next to impossible that we should have any other than discordant accounts of the actual direction of the wind.

### 3.—*The Barometrical Observations.*

These, though we have but one series of them, and this an imperfect one, are of very high importance, for they are a clear and distinct instance of a very great diminution of pressure occurring in a brief space of time, and over a very limited area.



4.—*Other Phenomena before and during the Cyclone.*

*Of those before it.*—The remarkable bank of clouds noticed both by myself and by Mr. Barlow at 200 miles distant, is the first of these. And supposing the Cyclone to have been travelling on a Westerly course, so as to pass the light vessel at the Sand Heads, watchful and careful commanders of ships would have had from this sign alone, some 24 hours of warning! and this would again have been corroborated by the remarkable twinkling of the stars, and their being seen so brightly at a very low altitude; an indication well known in the China Sea, and to which I have so frequently alluded. There was also at the Sand Heads as noticed by Mr. Barlow the *moaning* sound of the wind.

*During the Cyclone.*—The complete absence of thunder and lightning, as usual in these commotions, is another proof to the many we have of their electric nature, I think. That is to say: there is great electric action going on, but then the observers and every thing about them being enveloped in the electric disk and becoming conductors, do not feel it; and the transfer of electric fluid goes on till an equilibrium is established; but without discharges, because there is contact between the disk of the Cyclone and the earth.

The luminous appearance which so many of the observers so clearly testify to, is also a farther confirmation of this view,\* for there seems no doubt it existed but the moon being then twenty days old and passing the meridian at about 4 A. M. on the 13th, may have had something to do with it, as supposed by some of the respondents to my queries. Nevertheless, the balance of evidence seems to be considerably in favour of the existence of moon light.†

As it may be possible that the Rev. gentleman who is stated to have seen the phosphoric lights (reply to query No. 8, p. 20) may have been deceived by some appearances arising from burning houses or boats. I think it unnecessary to remark upon them, though there is no doubt, that meteors of this kind have been seen in Cyclones in various parts of the world.

Altogether it will be seen that this Chittagong Cyclone is evidently

\* See also Col. Reid's "Law of Storms," p. 74—76 for an instance of this light

† QUERE: is it this electric light which, when seen above, produces the "red sky" of the Southern Indian Ocean so well known there as the precursor of a hurricane?

one of a peculiar class ; being of small extent—of great violence,—of very moderate progressive motion—and probably not one travelling any distance to sea, so far as we are informed. There is no doubt that a considerable atmospheric disturbance was taking place all over the head of the Bay, as our Calcutta Barometers shewed ; and it appears to have resulted in the two or three violent little Cyclones which we have above recorded.

## No. IV.

## PREPARIS CYCLONE OF NOVEMBER, 1850,

*With a Chart.*

This Cyclone is a second, and a very instructive instance of the occurrence of these meteors in the Andaman Sea and Preparis Passage ; where the little sea room renders them doubly formidable. It will be remembered that the first notice we had of Cyclones within this narrow Volcanic sea formed the Twelfth of this series of Memoirs, which detailed the wrecks and miraculous preservation of the crews and troops on board of the ships Briton and Runnimeade. We have fortunately obtained for this brief Memoir, some very good logs of ships at no great distance from each other, and are thus enabled to say with considerable certainty what the track of the Cyclone was.

*Abridged Log of the Ship COWASJEE FAMILY, Capt. DENHAM from Calcutta towards Singapore. Civil Time.*

*Nov. 17th*, 1850.—A. M. wind E. N. E. and N. E. Daylight saw the land ; Working round the North end of the Cocos Islands. 9.15 A. M. centre of the Great Coco S. W. b. S.  $\frac{3}{4}$  S. Noon steady E. N. E. breeze and rain. Lat. Acct.  $14^{\circ} 10' N.$  ; Long.  $93^{\circ} 59' E.$  ; Bar. 29.90. P. M. hard squalls N. E. 7 P. M. saw *Narcondan* bearing S. E. b. E.  $\frac{1}{2}$  E. and at 9.30 it bore E. N. E. At 10 P. M. Bar. 29.50. At 10.30 wind “flew into the S. E. with terrific gusts.” Midnight, every thing blown or blowing to shreds, a perfect hurricane, and the sea making a clear breach over the ship, and clearing the decks, Bar. 29.20.

*Nov. 18th*.—A. M. “Still the same terrific gale, ship at times on her beam-ends. Daylight—ship a perfect wreck. Noon—a little more moderate. Bar. 29.35. Still a very hard gale. Ship lying very

uneasy, bore up and scudded N. N. E. Sunset more moderate, Bar. 29.40. Hove to again, head to Eastward, hard gale with constant rain to midnight.

*Nov. 19th.*—The same with a dreadful sea sounded in thirty-six fathoms water, and wore ship to the Westward. Daylight—gale broke, Bar. 29.55. Noon—fresh breeze and making sail.

*Ship JAMSETJEE JEEJEEBHoy from Bombay to China—from a Newspaper notice in the Singapore "Free Press."*

The ship *Jamsetjee Jeejeebhoy*, Captain G. Fitzmaurice, which arrived here on the night of the 24th instant, under Jury masts and Jury rudder, experienced a furious hurricane off the Cocos Islands, in the Andaman Sea, on the 18th November in Lat.  $13^{\circ} 45' N.$  and Long.  $93^{\circ} 40' E.$  in which she lost her rudder, was obliged to cut away her masts, and narrowly escaped being wrecked by drifting in a narrow channel between the Great and Little Cocos. The following are the particulars extracted from the ship's log with which Captain F. has kindly favoured us:—

"At 8 P. M. on the evening of the 17th November, the ship was going along with a fine fresh breeze from the North Eastward and clear weather, not the least signs apparent of a coming hurricane; the Barometers and Simpiesometer not indicating any change, being as high as 29.88, at which they had stood for some days previous. At midnight the weather suddenly became overcast, and dark clouds were rapidly rising, and before sail could be reduced, the wind had increased to a furious gale, with a tremendous high sea running. At day-light of the 18th, the wind had increased to a perfect hurricane, the wind veering round to the S. E. tremendous seas covering the ship, washing everything away from the deck, cabins and boats—the violence of the wind indescribable—blowing away all the topmasts; noon the water suddenly became discoloured, and on sounding found only twenty-five fathoms; the helm was immediately put up, but the ship would not answer her helm. The mizen-mast was then cut away but to no purpose, as it was found that the rudder was gone—cut away the mainmast; still the ship would not pay off—sounded in seventeen fathoms, cut away foremast, and let go both anchors when the ship brought up; at 10 P. M. the wind shifted to the S. W.—Hurricane

still blowing violently, and the ship entirely exposed to the tremendous seas that were continually washing over her. On the wind shifting the anchors both parted, and the ship drifted through the channel between the Great and Little Cocos; at midnight the weather moderating a little and the glasses rising; at daylight the gale had subsided, but a tremendous sea still running—found 8 feet of water in the Hold, and all the fresh water spoilt with saltpetre. The ship had drifted during the hurricane about forty miles to the N. Westward. The glasses were at the minimum at 4 P. M. of the 18th when they were as follows:—

|                     |       |
|---------------------|-------|
| Barometer, .....    | 29.15 |
| Sympiesometer,..... | 29.10 |
| Aneroid,.....       | 28.96 |

*December 27th, 1850.*

*Englishman, February 7th, 1851.*

*Abridged Log of the Ship JOHN ADAM, Captain DIXON, from  
Calcutta to Singapore. Civil Time.*

*Noon, Nov. 17th, 1850.*—Lat. by Obs.  $14^{\circ} 58'$  North. Preparis Island bearing E. S. E. distance six leagues. Wind marked North, ship steering  $2\frac{1}{2}$  and 3 knots to the E. S. E. P. M. wind marked N. E.; and at 2, E. N. E.; fresh breeze and threatening weather. 2 P. M. Preparis Island E. b. S. kept away to the S. E. for the South Channel. 4 P. M. South end of Preparis bearing E. b. S. distance twelve miles. At 8 P. M. dirty squally weather; in topgallant sails and double-reefed. Midnight heavy gales and hard squalls. Wind apparently\* always E. N. E.

*Nov. 18th*—From 4 to 8 A. M. increasing bad weather. North Coco Island in sight distant six miles (bearing omitted by an error of the copyist). Noon strong gales and heavy sea. No observation. P. M., wind marked E. N. E. and at 3 P. M. *South*. 2 P. M. kept the ship away for the Preparis Channel; but at 4 P. M. she broached to and went over on her beam ends; lost mainmast and mizenmast, boats, &c. 7 P. M. blowing a steady hurricane. 8 P. M. lost the foremast,

\* I say *apparently* for it is not marked again till P. M. of the next day; when it is still set down E. N. E. From the ship's position and the track of the Cyclone, it is not improbable that this was about its direction though it is much steadier, if so, than with the other ships.



everything in the cabins destroyed, including Chronometers, Barometer, Simpiesometer, &c. Midnight hurricane. Wind marked as "variable" and at 8 A. M. the next day S. East.

*Nov. 19th.*—Daylight the South Coco bore E. S. E. Set a sail on the stump of the mainmast and bore away N. N. W. Noon fresh breeze and cloudy North point of North Coco, bearing E. b. S. distant about eight miles.

*Abridged Log of the Brig ERIN, Captain PLUM, from Singapore to Calcutta. Civil Time.*

*At Noon, Nov. 15th, 1850.*—The *Erin* was in Lat.  $11^{\circ} 1' N.$ ; Long.  $96^{\circ} 16' East$ ; Bar. 29.89; Ther.  $86^{\circ}$  with fine weather. At midnight squally. Standing to the N. N. W. for the Preparis passage.

*Nov. 16th.*—Light variable winds and squally breezes from North to N. E. b. E. and E. N. E. At noon Lat. D. R.  $11^{\circ} 47'$ ; Long. Acc<sup>t</sup>. 95.26; Bar. 28.59; Ther.  $85^{\circ}$ . P. M. moderate. Sunset cloudy and *lightning all round*; squalls increasing till midnight, when "continued hard squalls with rain, thunder and lightning."

*Nov. 17th.*—Continued squalls from E. N. E. to East, with torrents of rain and *heavy lightning*; vessel reducing sail, weather very dirty all round; Noon Lat. Acc<sup>t</sup>.  $13^{\circ} 29'$ ; Long.  $95^{\circ} 5' East$ ; Bar. 29.89; Ther.  $86^{\circ}$ . P. M., wind is marked as *S. S. E.* to E. S. E. and East! 9 P. M. to midnight steady, strong breeze and clear; Bar: marked 29.90!

*Nov. 18th.*—Weather and sea increasing to noon. Wind East to S. E. and again at 5 P. M. "from S. E. to East and S. S. E. to E. S. E."\* At 10.45 A. M. saw the Preparis Island bearing  $W \frac{1}{2} S.$  hauled up N. b. W. being too near it. Noon it bore  $S. \frac{1}{2} East$ . Cow and Calf S. b. E.  $\frac{1}{2} E.$  (distance not given) wind East to E. N. E. P. M. gale increasing with high sea. Wind to midnight marked as S. E.; East; and E. S. E. to E. N. E. By midnight every preparation for bad weather was made, but the vessel making very bad weather; standing to the N. N. W. and North. Bar. at noon 29.75; at midnight 29.50. Brig always standing to the Northward and N. N. W.

*Nov. 19th.*—A. M. wind marked E. N. E. and East, to E. S. E. and

\* So marked in the Log. It will be seen in the summary that there is a probable cause for these remarkable variations.





S. East. Hard gale and severe squalls. At 1 A. M. hurricane; 1.30, vessel on her beam ends, cut away all the backstays. At 1.45 to 2 A. M. vessel upset with her masts in the water. Chief officer and Captain both washed overboard. Chief officer regained the vessel but the Captain perished. Vessel righted by the masts going. Cut away the wreck as far as possible. Hurricane continuing to 4 A. M.; at 5, gradually abating to a moderate hard gale; at 6 a fresh gale; at 7, wind West; noon wind S. W. moderate breeze and heavy swell.

#### SUMMARY.

The only records we have hitherto of Cyclones in this part of the Bay of Bengal are, the *Cashmere Merchant's* Hurricane off the Preparis 21st Nov. 1840, described in my Second Memoir (Journal As. Soc. Vol. IX. p. 433) and the *Briton* and *Runnymede's* Cyclone of Nov. 1845 (Twelfth Memoir, Journ. As. Soc. Vol. XIV.): and it is remarkable that this very severe one also occurs in the same month; in which also the French ship *Petite Nancy* was dismasted in the latitude of Cape Negrais and between Long. 90° and 91° East. It follows therefore that the seaman should be warily upon his guard in this vicinity in the month of November. I proceed to state the reasons on which the track of this Cyclone has been assigned; beginning with the *Cowasjee Family* which ship was at 7 P. M. on the 17th in sight of Narcondam, and but a few miles to the Westward of it at 9.30 P. M. when it was blowing a severe gale, which at about half-past 10 P. M. "flew round" to S. East having been before at N. East if the log is correctly marked. We may thus suppose that, as it was now blowing with hurricane violence, this was the centre of the Cyclone passing between Narcondam and the Andaman, and very close to the ship at that time.

We next find the same shift, apparently, from the imperfect account of the *Jamsetjee* at daylight on the 18th, and that the ship was drifting with the S. East gale till noon, when she anchored near the Cocos Islands, through which channel she drifted when the wind veered to S. W. so that we may suppose, she also was close to the centre, which thus passed in a N. N. W. direction over the Cocos Islands, travelling about fifty miles in seven hours and a half at this time.

We have next the log of the *John Adam*, which ship was approaching the Preparis passage from the Westward, but, as it appears from her log, was able to carry her top gallant sails till 8 P. M., but at



midnight had "heavy gales and hard squalls," so that we may suppose the Cyclone circles to have reached her position by this time, that is at midnight 17th to 18th November.

We have said above that from the shift of wind experienced by the *Cowasjee Family*, and that of the *Jamsetjee*, we might roughly estimate the Cyclone's rate of travelling to be fifty miles in seven and half hours, or, to the nearest decimal, 6.66 miles per hour; but as the exact positions both of the *Jamsetjee* and *John Adam* are uncertain, we may also take that of the *Erin* at midnight on the 18th and 19th, her log being the most carefully kept; which, supposing the centre to have passed close to her also when she was upset, will give us a distance of 150 miles from the place of the centre; at 10 P. M. on the 17th to that time, or for an interval of twenty-six hours, or again to the nearest decimal 5.77 per hour, for the Cyclone's rate of travelling. The mean of these two rates 6.66 and 5.77 is 6.21 miles per hour. Now as we have a position for the centre at half-past 10 P. M. of the 17th, it follows that if we project the track backwards for these ten and half hours at this rate of 6.21 per hour, it will give us about sixty-five miles, and we shall thus obtain an approximate place for the centre at Noon on the 17th. This spot falls in Lat.  $12^{\circ} 10'$  North; Long.  $94^{\circ} 8'$  East and in the absence of better data, I have also marked it with a circle of 150 miles in diameter, and this places the position of the *Erin* at Noon twenty miles without the true limits of the Cyclone circle, and accounts for the squally weather and heavy sea, which she now began to experience. I shall presently advert to the remarkable oscillations of the wind noted in her log.

To return to the *John Adam*. It would seem that it was at 4 P. M. of the 18th that she was blown over and dismasted, the shift of wind from E. N. E. to South noted in her log, having taken place at 3 P. M., and this we may take to have been the passage of the centre close to her. As before remarked, her position and that of the *Jamsetjee* are somewhat uncertain, not only from the imperfect notice of the one and the uncertain drift of the other, but also from the set of the tides and storm currents in the neighbourhood of the Cocos, and the North end of the Great Andaman; and again the track and rate of travelling of the Cyclone itself, were probably affected by the high land of the North Andaman also. We must thus

consider the centre at noon on the 18th, as passing up,\* somewhere between the South Coco and the Andaman, where I have marked the centre with an (?) and continuing its route to the N. b. W. or perhaps even North, till it reached the unfortunate *Erin*.

The log and track of the *Erin*, it will be seen, is that of a vessel first running up parallel to the track of a Cyclone, and in fact *over-running* it until she was overtaken by the centre, when obliged to cross in front of it. Altogether a dismal instance of error and mismanagement; from the sad penalty of which she might have escaped by heaving to at any time between noon of the 17th and day-light of the 18th or earlier!

Her track and that of the Cyclone, considered together, will explain the remarkable squally weather and varying winds of the Cyclone noted in her log, for we find the track passing close to, or perhaps over, two volcanic Islands, Barren Island, from which there has been a recent eruption (1852) of considerable violence, and Narcondam; and then out between the South Coco and Andaman. We can easily suppose that the winds with the *Erin*, while running up almost on a parallel course with the Cyclone at from seventy to eighty miles distance only from its centre, were affected by this, whether we consider the islands simply as mechanical obstacles disturbing the regular motion of the air in its Cycles, or Barren Island and Narcondam as volcanic foci, (and therefore electric centres?) exercising some peculiar influence on the electric disk of the Cyclone? The *Erin's* log is kept with care, and was no doubt regularly seen by Captain Plum, who was a careful seaman, and bore a very high reputation in Calcutta. But, if I am correctly informed, he was unfortunately one of those commanders who, from disinclination to study and change of views, thought the Law of Storms a mere shore-going speculative theory, of no practical utility at sea.

We have no farther records of this Cyclone in the Bay so that it seems to have been lost or broken up about Cape Negrais. As an instance of a violent Cyclone in this dangerous and volcanic tract, it is very instructive to the seaman; and to the meteorologist and naturalist not less so.

\* Perhaps even on a curved track, till it cleared the high land of the Andaman, for we know that high land does influence the tracks of Cyclones though we know not how, nor why it does so.

*List of Arabic Works preserved in a Library at Aleppo, communicated by Capt. MACLAGAN, Bengal Engineers.*

من وقف محمد باشا

صحيح مسلم \* صحيح البخاري \* النسائي \* الترمذي \* ابي داود \*  
 حاشية الشيخ ابي الحسن السندي على سند ابي داود \* التفسير الكبير \*  
 عدد كتب سنة للمحبي \* المناسبات \* تفسير ابي السعود \* الدر المنثور \*  
 تفسير البغوي \* تاريخ الخميس \* التفسير الكشاف \* شرح الجامع الصغير  
 للعلموي \* سذن ابن ماجة \* متن الجامع الصغير \* المشارق للقاضي  
 عياض \* حاشية الترمذي و النسائي \* ابن ماجة \* مجموع كتاب  
 الجامع الصغير \* مجموع شرح النقاية \* الفتاوى الحديثة \* شرح  
 الهمزية \* شرح مراة الاصول \* شرح ارقية المصطلح \* شرح المشكاة \* الاول  
 والثاني من شرح الشفاء للخفاجي \* حاشية على شرح المحقق \* شرح  
 جمع الجوامع للمحبي \* بهجة الناظرين \* الهداية في تحقيق الدراية \* شرح  
 الشرائع النبوية \* التدبيرة في علم الحديث \* تفسير المهدوي \* نعمات المغيرة \*  
 شرح الشاعبية للجلال السيوطي \* فضل الحيل \* شرح المعراج للعليلوبي \*  
 حاشية مصطفى لانطاكياني \* نفائس العرائس \* شرح السراجية \* الجزء  
 الثاني من رجال الصيحين \* الجزء الثاني من الشفاء للخفاجي \* البهجة  
 النبوي في الطب النبوي \* اتحاف الرخصة في فضائل المسجد الاقصى \*  
 جمع الرسائل \* المستطرف \* المنهاج \* تحفة الاصحاب \* فتح الرحمة \* الاوقاف  
 و الجواهر \* تاللات الماتريدي \* التصريح \* متن الكافية \* الجزء الاول  
 من شرح حواشي التوضيح \* مرور الصيت \* المعنى في الاسرار \* حاشية  
 العمادي \* ديوان العباس \* الفتاوى للحاوي \* حاشية التوضيح \* الاشباة  
 النبوية للبوجيري \* الشجرة النبوية \* امداد الفتاح \* الفتاوى الحيرية \*  
 المدارك \* التلخيص \* ادب الكاتب \* الجواهر والدرر \* مناقب الابرار \*  
 مناقب ابي حنيفة النعماني \* الجزء الثاني من شرح الكنز \* شرح الملحمة \*

الجزء الاول من شرح الارشاد \* فوائد الكافي \* حاشية العزي \* شمس السراجية \*  
 التلخيص فى المعاني والبيان \* ملتقى الابحر \* تحفة الملوك \* شرح  
 الجزرية \* شرح الكنز \* الحاشية على الفتاوى \* شذور الذهب \* الميزان  
 للشعراني \* الرابع من تفسير ابن عباس \* مجموع الارشاد فى القراءة \*  
 شرح السنوية \* شرح الاقتناع \* الجزء الاول والثاني من شرح نظم الكنز \*  
 الجزء الثاني من مختصر الانساب \* الجزء الاول من تاليف نوح بن  
 مصطفى الحنفى \* تبيان الحكم \* شرح سيرة الكبرى \* السير الكبير للآدم  
 محمود \* شرح الكناية \* الجزء الاول من تفسير القرآن لابن عباس \*  
 شرح مقدمة ابى الليث \* منية المصلي \* الجزء الاول من يتيمة الدهر \*  
 شرح القصيرية \* تعريفات السيد \* الجزء الثاني من المسيل \* الايضاح \*  
 اليونانية \* الشعر \* تفسير غريب \* القوافى فى العروض \* مقدمات ناصر  
 مطرز \* مختار من محاضرات كذاب حسن ابى قاسم علي بن هشام \* الجزء  
 الثاني من تحفة الاخير \* الفصول المحررة \* الحاشية على العقائد \*  
 النصف الثاني من الجلالين \* تفسير معالم التنزيل للبغوي \* الجزء الثاني  
 من الاحياء \* تفسير القرآن للمشرىبي \* الجزء الاول من مهمات الاسنوي \*  
 الجوهر للحدادي \* شرح تلخيص المفتاح \* الدر المختار شرح التنوير \*  
 حاشية الخفاجي على شرح التلخيص \* شرح المغازي على جامع الصغير \*  
 شرح الالفية للشموني \* الجزء الرابع من ربيع الابرار \* شرح النقاء للخفاجي \*  
 مغنى اللبيب \* بساين العارفين \* نزهة المجالس \* من المجلى من علم  
 الحديث \* القاموس المحيط \* نهمات الازهار \* مواقع النجوم \* حاشية على  
 شرح الاربعين حديثا لابن حجر \* الديباج على صحيح مسلم \* شرح الاجسام  
 للشينخ الاكبر \* مختصر الاصول \* حسن المحاضرة على مصرو القاهرة \*  
 جزء من تاريخ امين چلپى المحبى \* شرح الطائفة المحمدية للبابلسي \*  
 حاشية حسن چلپى \* المصابيح \* عنوان الشرف \* لب الاصول \* المطول \*  
 التنوير فى فقه الشافعي \* التلويح \* النصف من جلال الدين \* السكيروان  
 لابي حجلة \* بشارة المحبوب لغفران الذنوب \* الاول من تفسير النيشابوري \*



الثاني من الهدى النبوي \* الجلد الاول من الكواكب السيارة \* ابي رجب \*  
 رياض الصالحين \* مختصر المنار وفقه اصول و شرح المنار لابن مالك \*  
 شرح التوسيل باهل بدر \* السري للشيخ الاكبر \* لطائف الاشارات \* عین  
 الحيدة \* الشقاق في مسموم الترياق \* سراج القادر \* البيان والتعريف في  
 الحديث \* من آيات \* الاول من سعد الايمان \* تركي \* حاشية تفسير البغوي \*  
 مختصر الحاجب \* الجلالين للسيوطي \* شرح الزيد \* دلائل الخيرات \*  
 الجزء الاول والثاني من الهداية \* شرح التوضيح للمسايرة \* حالة الكاتب \*  
 شرح تصريف \* نور القدس \* مذبة المصلي \* الاقوار \* شرح مقصورة ابي  
 دريد \* حاشية عبد الحلیم \* نكت وفوائد \* شرح مقصورة ابي بكر \* الجزء  
 الاول للصنعين \* شرح الهداية للبدایة \* حاشية جمال الدين ابي الشریف \*  
 القضاء والحكومة \* الاول من الكافي \* ابراهيم الحلبي الكبير \* حاشية  
 البخاري \* مختصر الجامعين \* هدية ابي عماد \* حاشية عصام \* الجزء  
 الثاني من البحر \* مالكي في الفقه \* ضوء المعاني \* المختار في الفتوى \*  
 شرح الكمال \* درر الحکام في شرح غرر الاحكام \* ديوان العيدروسى \* كنز  
 الدقائق \* كنز الحقائق \* كنز المدفون \* الجزء الاول من فتاوى الهندية \*  
 الجزء الثاني من نخبة الافكار \* حسن چلبي للمطول \* الجزء الاول  
 والثالث من شرح الحماسى \* المطول \* جواهر الفقهية \* مجموع \* الاول  
 من شرح الموطأ \* مختصر منن البيهقي \* شرح العقائد \* شرح الديباج \*  
 رياض \* كشف البيان \* شرح المقرية \* شفاء شريف \* تاريخ ابن خلدان \*  
 شرح الورقات الكبير في الاصول \* شرح الالفية لابن ابي قاسم \* علي حسن  
 الشهيد بابي قاسم \* اليتيمة \* ابي البقي \* مسائل مصابيح \* فوائد العقائد  
 في شرح الشواهد \* المجلد في اللغات \* حاشية على شرح الشمسية \*  
 حاشية حسن الحلبي \* المقتضب في علم الادب \* شرح المراج \* الاربعين  
 في اصول الدين \* شرح المبدئين في فتح الاربعين \* شرح الالفية لابن قاسم \*  
 الاربعين \* الصواعق المحرقة \* الاول من الجامع الكبير \* الجلال \* نزهة  
 الهمجة \* الجزء الرابع من شجى زادة \* حاشية الغنيمي \* حواشي العضد

للتونسي \* الدقائق المحكمة \* التوضيح لابن مالك \* رسالة في امدادات  
 النفوس \* تفسير الجلالين \* شرح جمع الجوامع للچركسي \* السير والسلوك \*  
 مجموع فوائد \* جامع بيان العلم وفضله \* الكشكول \* الفن الخامس من  
 القانون \* العزيزي \* متن رحلة الشيخ مصطفی فی الرمح \* متن الذنوب  
 للعلائي \* الدرر والغرر \* حاشية على الخفاجي \* مبالغ الازهار في شرف  
 مشارق الانوار \* الشموس \* الفوائد والصلاة \* امين الطالب \* الصلاة الجامعة \*  
 شرح جمع الجوامع بالعريفة للمصنف \* شرح الاربعين للبوني \* حاشية  
 الاشموني \* مجموع \* شرح مغنى اللبيب \* شرح الشهود \* شرح العلامة  
 الدماميني \* طبقات العلماء لطاشكبري \* البركة \* شرح فصوص الحكم  
 لبالي افندي \* نفحات الازهار \* رحلة ابي منصور \* شرح عقيدة الغيب \*  
 شرح فصوص الحكم للبابلسي \* تفسير المفردات \* شرح الكافية \* حاشية  
 الدماميني \* شرح الدر \* شرح المفصل \* شرح الكناية \* روضة التعريف  
 من حسب الشريف \* صدر الشريعة \* شرح الالفية لابن قاسم \* الاول من  
 مختصر الانسان لابن امشير \* تفسير القرآن \* ديوان المتنبّي \* مجموع  
 رسائل استعارات \* شرح تائيد الشيخ الاكبر \* حاشية الدر \* الجزء الثاني  
 من مختصر السيرة \* الفتح الرباني \* شرح الالفية لابن عقيل \* مجموع من  
 كتب ورسائل \* رسائل الشرنبالي \* شرح تجليات محمود افندي \* حاشية  
 على الدر المختار \* تاريخ الدينوري \* الجزء الثالث من ربيع الابرار \* الجزء  
 الثاني من الفتاوى الهندية \* تركي لغات \* الشقائق النعمانية \* المستوي \*  
 شرح رسائل ملا حسين \* الافصاح على معاني الصحاح \* السعد التقنازاني \*  
 جوهرة المنظوم ومعها رسائل كتاب كمبذة الكبير \* الهداية في شرح الشامل \*  
 حاشية الاسد المغني على شرح الهزمية \* قصيدة البكرية \* الكنز الاسنى \*  
 فتح القريب بشرح مواهب المجيد \* شرح الهزمية لابن حاجب \* رسائل  
 للاستاذ عبد الغني \* المولد الشريف لنجم الدين \* شرح البخاري للشيخ  
 اسمعيل العجلوني \* شرح عبدالسلام للسبعة \* الديثابوري مقداركرايس \*  
 شرح دلائل الخيرات \* نزهة المجالس \* الامراء حكم \* مقدمة ابي الليث \*

مجموع من كتاب امداح الفتاح كوايس \* شرح فصوص الحكم \* الجزء الثاني  
من الاحياء \*

### من وقف عبد الله باشا عظم

الجزء الثاني من المواهب الدينية \* الاتقان من علوم القرآن \* الغرائب \*  
شرح طريقة المحمدية \* مطابقة الانوار \* جزء من امن تذكري \* شفاء  
شريف \* دلائل الخيرات \* شرح التذوير للعلائي \* مزية المصلي \* الجزء  
الثاني من شرح المنهاج \* نصف جزء من شرح البخاري \* نزهة الارواح \*  
الثاني من تحفة المنهاج \* شرح البيضاوي \* التحفة \* رحلة القدسية \*  
ابراهيم الحلبي \* مسند الامام الاعظم \* مجموع كتاب الخلفاء للسيوطي \*  
الجزء الاول من المواهب \* عيون الشرف \* الجزء الاول من الشفاء \*  
شفاء تركي \* ديوان خليل افندي المرادي \* الجزء الاول من البخاري \*  
برهان الدين الحلبي •

### بيان وقف عمر افندي القونية لي

ابراهيم الحلبي \* طالع السعد \* شرح الشامل \* ابراهيم عربشاه \*  
تلخيص الرموز \* الفرائد \* شرح دلائل الخيرات \* تفسير القرآن \* شمس  
الشموس \*

وقد وجد تسعة كتب بين الكتب المرقومة ليس بوقف

حاشية التلويح \* ديباجة \* طريقة المحمدية \* الاول من الشافي \*  
ناقص لايعرف \* مجموع \* الدر المختار \* الكيمياء \* البعث والنشور \*

*Notes upon some Atmospheric Phenomena observed at Darjiling in the Himalayah Mountains, during the summer of 1852.—By Captain WALTER STANHOPE SHERWILL, Revenue Surveyor.*

The Sanatarium of Darjiling situated in the lower Himalayah Mountains, at an elevation of 7,126 feet above the sea, and distant from the perpetual snow thirty-five miles, affords both from its elevation and from its proximity to the vast masses of perpetual snow and glaciers, a favourable position for observing several very beautiful phenomena that occur at all seasons of the year; added to which I may mention, that the full force of the South West monsoon is felt in these mountains. The monsoon blowing over the Indian Ocean and Bay of Bengal arrives at these mountains, three hundred and seventy miles from the sea, loaded with moisture, and loaded to such an extent as to precipitate, yearly, one hundred and thirty-six inches of rain. Much of this moisture is retained by the soil and forests covering the mountains, which assists in forming the phenomena now under consideration, and which may be divided into three classes.

*Firstly*; those that are caused by great cold and depend upon minute crystals of aërially suspended ice for their prismatic colours.

*Secondly*; those that are dependent upon moisture for their prismatic colours, produced by the refraction of light in passing through clouds, fogs or mist.

*Thirdly*; those phenomena that are caused by cold and sudden blasts of wind rushing from the snows, which meeting the warmer air of the valleys, or the hot streams of air that rise from the plains of Bengal, serve to form clouds by condensation.

Of the *first* named class of phenomena I observed but two; the first was observed on the 21st May, 1852, at seven in the morning, the air was pure and bracing, Thermometer 55° in the shade; the sky to the East was covered with a dappled and streaked mass of cirro-cumuli and cirro-stratus, at a probable height of 20,000 feet. Upon this true "mackarel sky" was depicted one of those glorious coronæ, only seen at great elevations or in high Latitudes.

The weather at Darjiling had been for the whole previous fort-



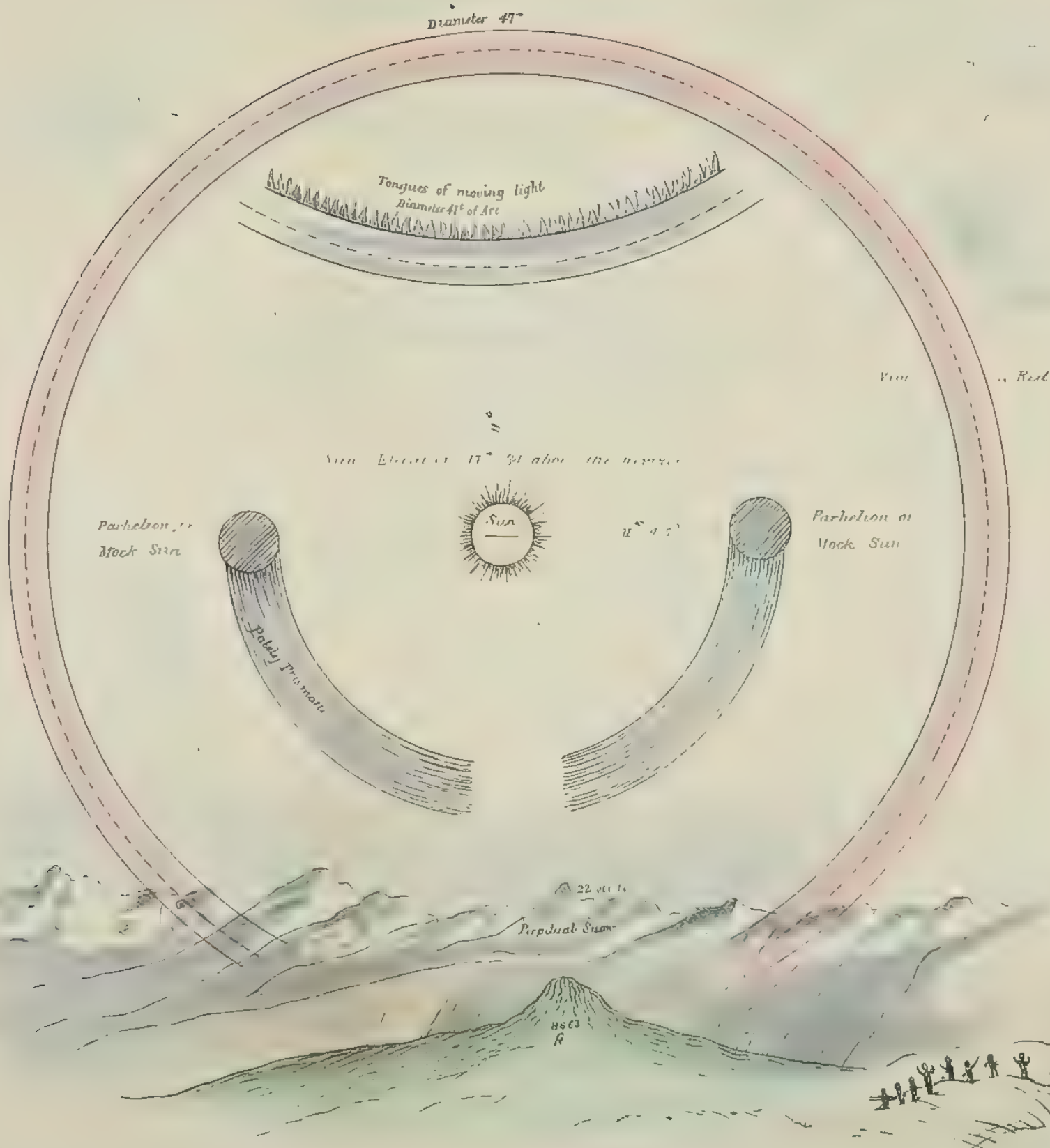
night a succession of heavy showers, fogs and bad weather, but the morning of the 21st was the commencement of a bright sunny day; the power of the sun, when that luminary was at an elevation (calculated) of  $17^{\circ} 34'$  was considerably dimmed, shining with a pale subdued light through the frozen mass of clouds in front of it; around the sun appeared a magnificent corona with a diameter of about  $47^{\circ}$  and nearly a complete circle Vide Plate II. ;  $300^{\circ}$  of the circle being visible, the remaining  $60^{\circ}$  being occupied by a gap where the corona appeared resting on the summits and sides of the Eastern snowy range, down whose slopes the ends of the corona dissolved and lost themselves. The corona was composed of two colours, violet on the edge nearest to the sun and red on the outer edge, the two colours blending together and forming a neutral tint in the middle of the corona; the order here observed with regard to the colours is similar to that observed in the rainbow.

The true sun was flanked on either side at the distance of  $11^{\circ} 45'$  by a parheliion or mock sun of a pale unrefracted light, at an equal altitude with the true sun, each parheliion forming the head of a segment of a circle with a radius of  $23^{\circ} 30'$ ; the segments of the circles attached to the parhelia hung as graceful curving fringed appendages, converging to a point below the true sun. The parhelia were equal in size to the true sun, and were equi-distant from the corona and true sun. Above the true sun was a segment of another circle with a diameter of  $47^{\circ}$  and distant about  $11^{\circ}$  from the true sun, the concave side or the side away from the sun, was beautifully fringed with prismatic and violet-coloured rays or tongues of moving light, the sharp extremities of the moving rays pointing and flickering upwards.

The main corona from its great size presented a magnificent object, and its prismatic colours were most brilliant, almost as brilliant as the colours of the true rainbow; contrary to the custom of rainbows which places the spectator between the bow and the sun, and which enables the spectator to gaze upon this beautiful object in the heavens with undazzled eyes, his back being turned toward the sun—the corona and parhelia are always between the sun and spectator and thus from the glare of the sun, much of their beauty is lost.



Frozen, fleecy clouds



# PARHELIA AND CORONÆ.

Observed 21<sup>st</sup> May 1852. 7 a.m.  
 above the Sun 7,165 feet } at Darjeeling. Lon. E. 88° 18'  
 Lat N 27° 09'

Mariotte, Arago, Herschell and others have referred the appearance of corona or halos to the refraction and reflection of minute crystals of ice, floating in the atmosphere.

This grand picture lasted about a quarter of an hour and was succeeded by heavy rain at Darjiling, and a fall of snow upon the higher and neighbouring peaks.

In the next phenomenon witnessed, a totally different arrangement of colours to the last, consequent upon the refrangibility of light when passing through a bank of frozen clouds was observed.

On the 21st September, 1852, at 6-45 A. M. Thermometer  $62^{\circ}$ . The heavens to the East were overspread with fleecy cirro-cumuli at an elevation of five miles; beneath the cirro small, light and transparent cumuli occupied a lower region at a probable elevation of 10,000 feet. Upon the frozen clouds above and a little to the South of the sun, there was projected a portion of an arc whose radius might be  $35^{\circ}$  of the most brilliant and vivid colours, the edge away from the sun being yellow, and the edge nearest to the sun red; the intermediate space being occupied by a combination of all the prismatic colours, not a perfect amalgamation of the colours, otherwise the colour would have been white, but small particles of each colour appeared sparkling and wavering like the colours seen upon the inside of a pearl oyster shell.

At the lower end of the main segment, a distorted but very brilliant corona, was joined to it at an angle of  $35^{\circ}$ . This latter corona was about one-half the width of the larger segment, but much longer and with a similar arrangement of colours. Its shape, which resembled an S, threaded its way amongst a series of light flying cumuli until it disappeared amongst the small cirro-cumuli of the back ground.

A light easterly wind was blowing at the time with a drifting scud below the cumuli which occasionally obscured portions of the brightly-coloured coronæ. The two coronæ had a gentle motion towards the South.

The group was seen between the sun and spectator, and lasted twenty-five minutes.

The planet Venus shone brightly the whole time between the two coronæ.



As before remarked, the two phenomena just described were seen between the spectator and the sun, the spectator having his face turned towards the sun, and that they owed their brilliant prismatic colours to light refracted by small spiculæ of ice floating in the atmosphere; those now about to be described, on the contrary, were seen when the spectator was between the sun and the phenomena; and with the back turned towards the sun; and further they owe their prismatic colours to the refraction of light, falling upon minute vesicles of water containing air suspended in fogs; they are in fact *Fog-bows* and all those seen by me were seen early in the morning when the sun was  $12^{\circ}$  to  $18^{\circ}$  above the horizon.

The spectator must be placed between the sun and a fog; turning his face towards the fog he will see his figure reflected upon the opposite cloud, surrounded by a succession of concentric circles of brilliant colours, refracted by the watery particles of the fog; and following the order of the colours as seen in the rainbow. (Vide Plate III.)

A line drawn from the sun through the spectator's head to the common centre of the circles is a straight line.

The general appearance of a very perfect fog-bow, is as follows; by which it will be seen, that some of the colours of the prism are wanting, or taking violet or the upper colour of the solar spectrum as 1, numbers, 2, 3, 4 and 6, are wanting. The spectator sees his figure about thirty yards in front of him, surrounded by a disc of a greyish, or pinkish neutral tint, with a diameter equal to his own height, but with the head exactly in the centre; beyond this central disc which is edged on the outer circle with a pale violet, appear the following circles of colour, viz. violet, yellow, orange, their width bearing the correct proportion as ascertained by the prism, viz. the violet eighty parts; yellow forty; orange twenty-seven; the three circles occupy three semi-diameters of the central disc; beyond this first series of circles another series is visible, observing the following arrangement of colours; violet, green, yellow, orange; the circles being much broader than those in the first series, the brilliancy of their colours much fainter and rather confused. Beyond this second series of colours a colourless or white bow is sometimes seen with a radius equal to six semi-diameters of the inner or first series of colours, viz. from the centre of the disc where the spectator's head is reflected, to the exterior of the first orange colour.



Fog Bow Observed at Dampier 7165 feet above the Sea Lat South 27° 0' Lon. East 88° 18' Barometer 23.50 Ther 65° 23' June 1852. T. A. M.



Depending from the shoulders of the spectator is a dark neutral tinted pyramidal shade, resembling a flowing garment, occupying about  $72^\circ$  of the central disc.

From the outside rim of the inner yellow circle, long pencil-like rays of neutral tinted or gray colour, radiate in all directions, spreading and increasing in size in proportion to their distance from the centre, until lost in the surrounding haze.

The fog-bows with these spreading rays are very beautiful objects, but these rays are frequently wanting.

Another fog-bow commonly seen at Darjeeling, consists of the usual neutral coloured disc, one series of concentric circles exhibiting violet, yellow, orange and blue (this latter colour it will be observed is contrary to the regular order of the prismatic colours) beyond these circles at three and half diameters of the disc, comprising the whole of the four colours is the usual unicolour bow but no radiating pencils of gray colour. Depending from the shoulders of the spectator is the constant garment-like appendage. The figure reflected upon the fog, follows all the motions of the spectator, who, is the accompanying sketch is represented with his hat in his right hand, whilst the left hand is raised above his head.

For the sake of easy reference I append the colours of the solar spectrum, together with their values as ascertained by Sir Isaac Newton; also the order of the colours of the ordinary rainbow.

Order of the colours as shewn when refracted by the prism :

|                  |    |                                                     |                   |    |
|------------------|----|-----------------------------------------------------|-------------------|----|
| 1. Violet, ..... | 80 | In the rainbow,<br>violet is nearest to<br>the sun. | 5. Yellow, .....  | 40 |
| 2. Indigo, ..... | 48 |                                                     | 6. Orange, .....  | 27 |
| 3. Blue, .....   | 60 |                                                     | 7. Red, .....     | 45 |
| 4. Green, .....  | 60 |                                                     | Total length, 360 |    |

and red furthestmost from the sun.

The upper rainbow from being produced by two reflections and two refractions of light, has its colours reversed.

Another, but transient and hurried, phenomenon of the second class is sometimes observed by a spectator, when he is standing with his back to the sun and looking down from a height upon a bank of snow-white cumuli, upon which the rising or very early sun is shining.



The bank of cloud becomes suffused with a shining opalescent light, too delicate to be described either by words or by colours; mingled with this opalescent tinge, distinct prismatic streaks or bands are observed following the order of the prismatic colours as arranged in the rainbow, but only displaying the three primary colours, viz. blue, yellow and red, which are repeated over and over again in succession.

The finest bank of this description I ever saw, was upon the 9th August, 1852; when standing upon the Singaleelah range at an elevation of 12,000 feet above the sea, I looked down upon a bank of snow-white cumuli that were about 5,500 feet below me, in the Nepal Territory. The Thermometer stood at 58°. These appearances so soft and delicate, last but a few minutes and then disappear.

It is an axiom in optics that a rainbow cannot be seen unless rain is falling between the spectator and that part of the sky which is opposite to the sun; the following description of a rainbow seen by me requires more explanation than I am capable of giving to it, to account for its appearance and anomalous position.

Upon the 25th September, 1852, at 2 P. M. Ther. 68° whilst standing at an elevation of 7,165 feet above the sea, the heavens partly overcast by heavy cumuli, and looking down in a North Easterly direction into one of the deep valleys, I perceived at 3,000 feet below me and two miles distant, a magnificent rainbow following for about one mile the exact wavy outline of the crest of a sloping mountain; the colours being, a very brilliant violet nearest the spectator, and then a dark and very vivid green, then yellow, red, then yellow; and upon the *next mountain* another red was shown; the trees in the forest, the Native clearances and their houses were all seen bathed in these vivid colours, but there *was no apparent rain falling*, only a brightly transparent mass of cumuli was passing over the sun, which obscured my position, whilst the bow and the mountain upon which it was projected were in bright sunshine.

The colours of the bow were far more brilliant than those seen in the brightest usual rainbow.

*Phenomena of the Third Class.*

The 29th May, 1852, was a warm, dry summer day and had been highly favourable to evaporation and, though invisible to the eye, the air was charged with moisture which suddenly showed itself in an extraordinary manner as a huge cumulus, fifteen miles in length at an elevation of 11,000 feet, which was rapidly formed by condensation of the invisible vapour caused by a chilled stream of air descending from the snowy-range distant thirty-five miles; the effects of this cold blast was first shown in the formation of a cumulus which rapidly formed, until as above described, it extended to fifteen miles in length and about 5,000 feet in thickness. This fine body of vapour was driven rapidly to the South, and as it approached the mountain Tonglo which rises to 10,009 feet above the sea, the lower portion of the cumulus, which had hitherto been stratus or nearly horizontal, began throwing down about twenty water-spout-like looking tails about one thousand feet in length each; which gyrated at a rapid pace increasing in length at the same time, until the whole cloud burst into heavy rain. The distance of the Tonglo mountain from the spot of observation was eleven and half miles, therefore the gyration of the tails must have been very rapid to have enabled me to see it with the naked eye.

The attraction of this cloud by the mountain must be referred either to electric causes which caused the cloud to condense into moisture; or else that the cloud had entered a cooler atmosphere near the mountain than it had been travelling in before it reached the mountain Tonglo. Snow lies in patches in May near Tonglo (I have seen it in large patches on the 12th May) which of itself is enough to condense any cumulus, heavily laden with moisture.

That there was some attraction is beyond a doubt, as the tails one mile North and South of the central mass of tails descended at an angle of  $45^{\circ}$  with the horizon, and all seemed striving to reach the very summit of the mountain, upon which they all burst upon contact taking place.

The following rapid and consecutive formation and dispersion of clouds I have frequently observed during the summer months, when the sun, pouring down its almost perpendicular rays—Darjiling stands in North Latitude  $27^{\circ}$ —into the deep valleys, causes a rapid

ascent of heated air, and as rapid a descent of cold air to supply its place. Standing at an elevation of 7,000 feet and looking down into the valleys at the foot of the Goong range, South of Darjiling, small patches of clouds are seen to form at an elevation of about 2,000 feet, which with great rapidity rush up the side of the mountains, increasing in size at every hundred feet from the rapid condensation of the heated vapoury particles as they meet with a colder medium; upon reaching the summit of the lofty Goong range a mountain 7,400 feet in height and encountering a cold Southern blast from the upper regions of the atmosphere, they are again dragged down into the valley by this stream of air and at the same rapid pace they had ascended with; but decreasing in size until at an elevation of 2,000 feet they again disappear, then water particles re-expanding into an invisible vapour. I have seen this wild race of clouds kept up for hours until the sun sinking in the West and depriving the valleys of their heat put an end to this lively scene.

Looking down from Darjiling into the deep and capacious valley of the Rungeet river, the following beautiful appearance may generally be seen during the early mornings of the spring and summer. The valley, from the source of the great Rungeet to its junction with the Teesta river a distance of fifty miles, may be seen filled to the height of 2,000 feet with a heavy dense and snow-white mass of cumulus, resembling the softest and fairest carded cotton; the upper surface of the cloud upon which the spectator gazes is broken into a thousand softly outlined and rounded masses of cumuli. The whole mass has a gentle motion with the stream of the Rungeet.

This phenomenon is caused by the cold from the water descending from the snows and glaciers condensing the warmer vapour at the bottom of the valley.

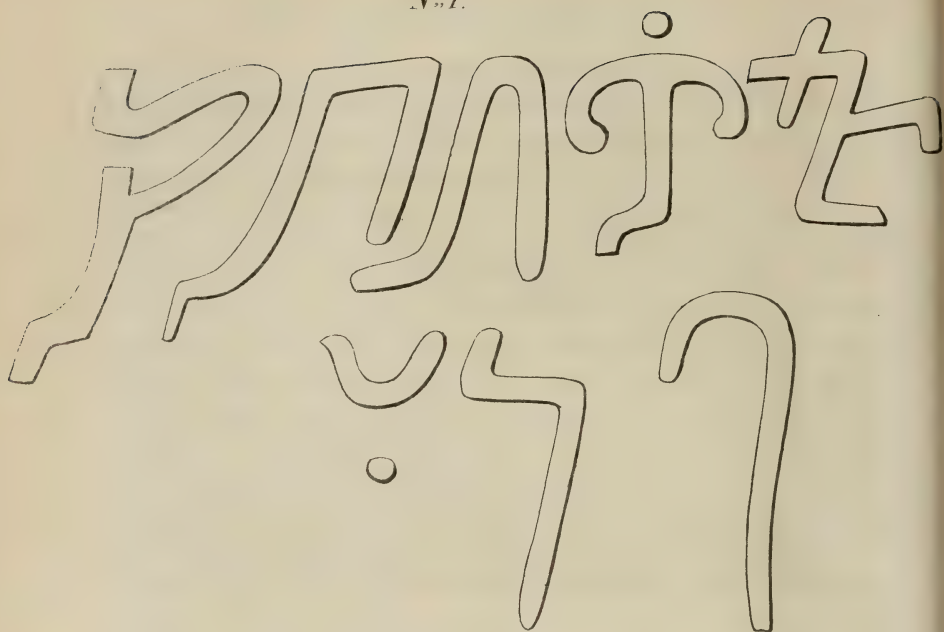
The sun's appearance and warmth is the signal for the dispersion of this very beautiful object.

The last phenomenon that I shall notice, is one that from its singular appearance has given rise to the idea that Kunchinjunga, the highest measured mountain in the world, and which rises to the height of 28,177 feet above the sea, is a volcano.

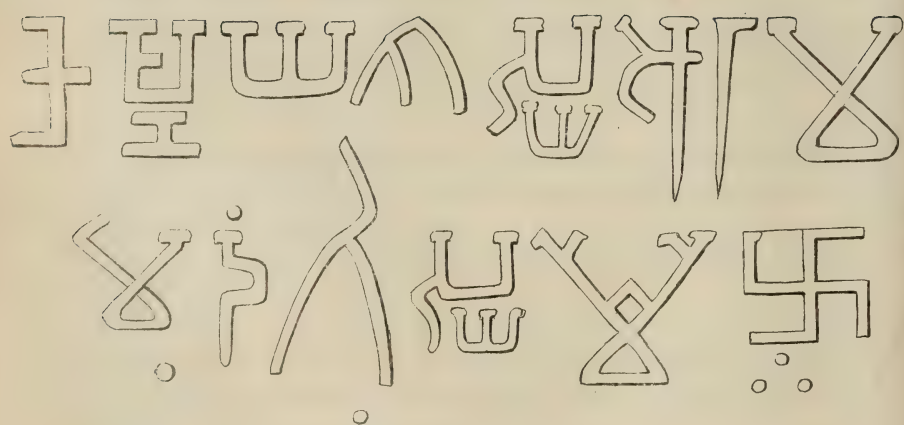




N<sup>o</sup> 1.



N<sup>o</sup> 2.



Upon any fine summer day when the heavens are pretty free from clouds a long and white smoke-like horizontal cloud is seen extending for several thousand feet from the immediate summit of Kunchinjunga ; generally in a North Easterly direction ; as this cloud is never seen on both sides of the peak at the same time, and as the cloud has a visible motion to the north-east, and as it appears to rise out of the crater-like face of the mountain, it certainly has all the appearance of a continued supply of white sulphureous smoke being emitted from the peak.

It may be explained as follows ; a current of air passing over the warm valleys of Nepal is driven up the face of the snowy range, a portion of this current of warm air as it passes over the summit of Kunchinjunga is condensed by the bitter cold air on its north-eastern or Tibetan face and thus brought into sight.

An Indigo-planter, who had lived for forty years in the plains and in sight of Kunchinjunga, declared, that nothing would convince him that the mountain was not an active volcano.

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*Note on two Inscriptions at Khunniara in the Kangra district.—By*  
E. C. BAYLEY, Esq. C. S.

The two inscriptions, of which rubbings have been already forwarded, and of which copies by hand are now sent, are cut on two large granite boulders about thirty yards apart, near the village of Khunniara—pergunnah Rehloo, zillah Kangra.

They are situated in a field about half way between the village itself and the station of Dhurmsala on the edge of the high bank of a mountain torrent, which issues from the lofty Dhurmsala range about half a mile to the north-east.

They are so clearly cut that there can be little doubt as to the reading of either, one being simply—

“*Krishnayasasa árāma,*” in Arian Pali, (Plate I. No. 1) the other—

“*Krishnayasasya árāma médangisya.*” (Plate I. No. 2.)

No. 2, which is in the square Indian character, has two additional symbols at its termination, one is the mere “swastika,” the other,

Major Cunningham interprets as an abbreviation of the syllable "om." The purport of both inscriptions is therefore nearly identical.

"The garden of Krishnayasas," to which in the second inscription some wag has apparently added the epithet "medangisya" "corpulent," from मेद् "méd" fat, and अङ्ग "anga" a body. The subject matter therefore deserves no further notice, save as regards the etymology of the proper name, which being compounded of कृष्ण Krishna and यशस् yasas "glory," and bearing in composition the meaning of "glory of Krishna" would seem to indicate the admission of Krishna into the Hindu Pantheon at the period (a very early one as we shall see presently) when the inscription was cut.

If however this be eventually established, it by no means follows that the name was applied to the same deity as at present, still less that he was worshipped in the same manner.

Leaving, however, the matter of the inscription, the employment of two alphabets, and the two *dialects* which the diverse inflexions point out, is a curious fact. Perhaps it may not be too much to infer that at the date of the inscription, the Jullunder Doab was intermediate between the territories to which each alphabet and each dialect was peculiar.

With respect to the *date* of the inscription, the form of the Indian letters had already lead me to assign them roughly to the first century A. D., on shewing them, however, to Major A. Cunningham, he kindly pointed out that the foot strokes of the Arian letters, ally them to those on the coins of "Pakores," and he therefore would place them more accurately in the first half of the 2nd century A. D. at the earliest.

Some other alphabetical peculiarities remain to be noticed. The most important of these, is the distinct use of the "anuswára" over the second letter of the Arian inscription, to represent the "n" of the Indian one, in the name "Krishna." Some versions of the name on the coins of Amyntos and Menander had already led Major Cunningham to suspect the employment of the "anuswára" to represent nasal sounds in the Arian alphabet, it is now beyond doubt.

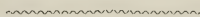
The first letter of the Indian inscription seems also to shew the expression used for the vowel "u" in composition which during the

period to which Major Cunningham assigns these inscriptions is left blank in Prinsep's comparative alphabet.

The second "s" of "yasas" has also a rather peculiar form, and the back stroke in the centre of the upright line of the initial "a" in "aráma" appears to be the distinguishing mark whereby it is made a long vowel.

For the drawings by hand I am indebted to Lieuts. Crofton and Dyas of the engineers who accompanied me on my visit.

I may add in conclusion, that I have in vain sought for any further traces of antiquity in the immediate neighbourhood of the inscriptions.



*On the Ballads and Legends of the Punjab.—By Major J. ABBOTT.*

In the eye of the Antiquary or the Lover of the picturesque, there attaches to old ballads and legends, an interest such as haunts the ruined edifices, sculptures and coins of a race long since extinct. In India these Legends and Ballads are confined to the mountain, the forest and the desert, or to the tracts adjoining either. In the more speedily subdued and cultivated plain, they seem to have been effaced with nature. Those of the Hindoo are often of a high order of moral beauty. But they have been neglected, and will soon be irretrievably lost. A few of these ballads and legends my very scanty leisure has enabled me to preserve.

Until the ideas of a nation have been matured and elaborated by the formation of a distinct class of literary mechanics, the most vigorous of its effusions will generally be found in the form of ballads handed down with their music orally from generation to generation: and forming the delight of the unoccupied gentry, who can neither read nor write, and who are indebted to their Bards for the murder of that heavy time, which can be spent neither at the board nor in field sports. Ballads therefore have an importance which is not to be weighed by their rude measure and occasionally childish fancies. They are the first effusions of the poetic fire, ere the Devil



had sent bad critics to spoil a dainty dish ; and ere scholastic prozers had discovered the wondrous secret of drilling essays too heavy and lame for prose, into the goose step of verse. To please their audience, it was necessary to be ever alive. No learned dissertations, no elaborate arguments were required by the unschooled circle. They were children of nature with some strange exaggerated notions of the unseen world. But even their monstrous puppets moved with the ease of nature, and every deviation from her harmonious laws, was felt and resented as a blemish ; and the slumber of the audience and their neglect of the minstrel were unmistakeable warnings that his style must be changed.

The interest I have ever felt in listening to these old traditionary lays is not easily described. I remember, that it is the music to which have thrilled the hearts of a nation during centuries of unrecorded years. And I cannot but think that every scanty relic of this first poetry of a people, is worthy of rescue from oblivion at the expence of considerable pains.

It is impossible to touch upon any tradition of the Doaba\* of the Indus and Jelum, without anxiously searching for traces of the vanished race of the Indo and Seytho Greeks whose coins and gems meet us in every old deserted site. This indeed forms the chief spell of every such research. *That* people, who burst in upon the darkness of barbarism accomplished in all the elegant arts of the most refined civility, to a degree unequalled by their successors in the lapse of 2000 years ! What a strange spell of darkness and oblivion rests upon their annals of light, upon their past exploits, upon their ultimate destiny. It seems utterly unaccountable, that the multiplied descendants of those few but matchless conquerors, who, isolated from support by thousands of miles of desert and myriads of warlike foes, could yet maintain for a thousand years or more their supremacy in a foreign land ; should thus totally have vanished from the face of the earth, leaving none to claim the proud title of offspring of the †Kings of Kings.

\* For the general English Reader, Doaba is a tract between two rivers. We have no English equivalent, and therefore it is worthy of adoption into the language.

† Kings of kings—*βασιλευς βασιλεων* is the Title generally borne upon their

There is but one race in the Sind Sagur Dooaba,\* whose name, physiognomy and history appear derivable from a Grecian source, I need not name the Gukkur tribe. By a negative argument, therefore, we might seem compelled to adopt a genealogy, which they themselves wholly disavow. I shall make no apology for delineating the points of resemblance, and of divarication between the Gukkur whom the Sikhs found dwindled to petty princes of Potowar, and the Grekoi whom Alexander planted in that spot and who, for about a thousand years, continued there to reign.†

The Gukkur in physiognomy is sometimes Greek, sometimes Persian. In general character, he is decidedly superior to the races around him, but not more civilized. He is accounted truthful, brave and honourable. The justice‡ of the Gukkur Sooltauns is still proverbial in their country. The Gukkur will give his daughter to none but a Gukkur. He is not a child of the soil. Has seldom any claim as a cultivator. But he has pretensions to the Kingly share—lately wrested from him. If not a ruler, his vocation is arms. But want has lately driven some to cultivate, which they consider degrading. They have no connection with Pathans or Hindu tribes, nor with any other class around them. In the earliest historical notices of the Sind Sagur Dooab subsequent to those of Greek writers, they appear as Sooltauns between the Indus and the Jelum. Thus they continued until the reign of Hoomaioon, who flying to them for

earlier coins, and on the reverse Raja Rajaôn shewing that the term Maharaja is modern.

\* I must however except the Awaun tribe, of whom I may write more anon. Yavaun is the name by which the Greeks were known in the Hindi annals. Awaun may be a corruption of this. The Awauns call themselves, however, Arabs. Supposing their account correct, we may doubt whether the Hindu records of Yavans refer to Greeks and not to this remarkable race.

† It was my pleasant task when Boundary Commissioner to procure the release from prison of about twelve of this persecuted race and to get provision made for several.

‡ It is said that one bleak night of winter Sooltan Sahrung sitting in his palace at Dhangullee, heard the gheders yelling without, and judging that it must be from cold sent them out cloaks.

protection, was sheltered and defended by them from the usurper,\* Sher Shah, which drew upon them the persecution of the latter, in which Sooltan Sahrung was slain. Faction afterwards arose in the family, and the little kingdom was split into two, viz. Dhangulli and Furwala, and subsequently into three principalities which were again subdivided. In this state they continued until the rise of the Sikh Sirdars who preceded Runjeet Singh. These, by their union and by the division of the Gukkurs, contrived to wrest from them the greater part of their plain territory, and Runjeet Singh by means of Raja Goolab Singh and Sirdar Hurri Singh completed their spoliation, imprisoning some and driving others into banishment. So much we know of them from other sources than their own histories and traditions. In all the particulars above recorded, they would answer well to the description of Indianised Greeks.

Of such descent however they have no tradition. They are not aware that their history is any way connected with the coins and sculpture of the Indo and Scytho Grecian Kings, or with the Topes, the latest monuments of the half Grecian race. They are wholly ignorant of the Greek character and being Moosulmans, their historical records, which are modern, are of course written in the Persian character. The Muhammadan invasion is the great stumbling-block of Indian history. Excepting the Pathans who being children of Israel, fondly believe that they had never lapsed into idolatry, all converts to Islaum are ashamed of that page which preceded their conversion. They cannot bear to think themselves the sons of Kawfurs (Infidels). As the strongest expression of scorn—is not, “you dog”—but “you son or grandson or greatgrandson of a dog,” the disgrace increasing as the genealogy ascends (because a man is always supposed by Eastern piety to be a degenerate type of his father) so to be the remote grandson of a Kawfur is far more terrible to an Asiatic than to be merely in himself a Kawfur,† and thus they studiously conceal their annals previous to their conversion,

\* The Massive Fortress Rohtass was built to controul their incursions.

† We have little right to blame Muhammadans for their absurdity, so long as we reverence more the rotten descendant of a great man than the virtuous offspring of a malefactor.



until such are wholly lost from memory. We must add to this, that it was a virtue of the first water in the eyes of the Muhammadan invaders to destroy all books excepting the Koraun, all temples excepting the Musjid—all coins having images of man or of beast.

About the 13th century, indeed the Muhammadans began to apply themselves to the construction of history, but with the same orthodox hatred of truth, whenever it appeared to them in any form but that of their preconceived notions.\*

The devout historian, or the historian who wished to be read and admired by the learned, i. e. the devout Moosulman, felt shame and contamination in touching upon the filthy annals of Kawfurs. His own righteousness was liable to question in condescending to interest himself in the affairs of such sons of perdition. He would as easily have turned to trace the genealogy of unclean beasts from the days of Noah to the present. It follows that instead of seeking to lengthen his pedigree after the example of other races, the Muhammadan, if he be not a Pathan, (for Pathans fondly believe they have been Moosulmans from the days of Jacob) takes care to go back no farther than to the dawn of Islám, that he may interweave some fable of the conversion of the founder of his race. The Gukkur will be found no exception to this general rule: of which it is necessary to caution the reader, previous to an examination of genealogy.

The existing Gukkur histories give the following succession of Gukkur Sooltauns, whom they believe to have held first their Native province, styled by them† Kyán in Persia and Afghanistan:

\* Ferishta may be cited as an exception to this rule in its more stringent sense.

† I cannot find in either Malcolm or Fraser's history of Persia any account of the origin of the term Kaianian applied to the dynasty which commenced in Kai Kobad. Dr. Herbelot derives it from the word Ky, in Pehlevi, signifying a giant or a great king. The ancient Hindu kings have sometimes the affix Bîr or hero, as Bîr Vikramaditiya. The province of Ghyn may possibly be the nursery of that illustrious family. A native of Ghyn would be called Ghyáni, which would easily pass into Kyáni, especially as there is no history or MS. of so early an age, and the ear only gave law to the orthography. Ghayn may very well have been at times a portion of Khorussaun; though I rather think it is not within the limit usually assigned to that extensive country.



to have been thence driven Eastward, until they had conquered the Sind Sagur Dooab, Cashmere and Thibet: then to have lost Cashmere and finally to have retained only the Northern portion of the Sind Sagur Dooab, where the Muhammadan annals first find them. Many old sites of Gukkur cities are found as far South as the salt range, and all these yield Indo-Greek coins to research.

In the Raja Tarangini nothing is discoverable that seems to relate to the conquest of Cashmere by the Gukkurs. But in like manner, that history is silent regarding the Greeks, who undoubtedly were Lords paramount of Cashmere, at one time, as evidenced by their coins and architecture. It is therefore impossible to place any confidence in the Raja Tarangini, when that history treats of periods long anterior to the times of its author.

The Gukkur history beyond doubt is a compilation of modern date from traditions then existing. I have added a column of parallel events affecting the destiny of the Punjaub, to aid the general reader in judging of the value of these annals, which however are very meagre of incident.

*The Gukkur Dynasty according to their own Records.*

| No. | Gukkur Sooltans.          | Date.    | Relation to predecessor. | Events in the Gukkur Annals.                                                                                                                                             | Parallel events in other instances of the Punjab.                                                                                                                                                                                                                                                   |
|-----|---------------------------|----------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Ky Gohr, .....            | A.D. 655 | ..                       | King of Kyan in Persia, mighty as Ky Kaoos. Seems to have been dispossessed of the western portion of his kingdom, styled in these Annals Kyan.                          | A.D. 650. The Muhammedan empire extended to the Oxus by the Arab conqueror. Cabul annexed—Prince of Cabul becomes tributary to the Arabs who make 12,000 converts. A. D. 668. Cabul having revolted, is invaded, Arabs defeated. A.D. 686. Cabul conquered by Abdool Rehman Governor of Khorussaun. |
| 2   | Kyde, .....               | 676      | Son.                     | Conquered Thibet and grafted Islam upon the dwellings of owls. Making a paradise for the Hooris in every place of fear among the mountains haunted by Deeves and Purris. | Abdool Rehman rebels, assisted by prince of Cabul. Defeated, destroys himself A.D. 704. A.D. 686. The Gukkurs join the Afghauns and compel the Raja of Lahore to cede to them territory.                                                                                                            |
| 3   | Tibbut or Fulluk Sooltan, | 697      | Son.                     | ....                                                                                                                                                                     | A.D. 711. Sind conquered by the Arabs.                                                                                                                                                                                                                                                              |
| 4   | Junnut, .....             | 718      | ..                       | ....                                                                                                                                                                     | A.D. 712. Arabs conquer Transoxiana. Empire of the Khalifs.                                                                                                                                                                                                                                         |
| 5   | Shoojarr, .....           | 739      | Son.                     | ....                                                                                                                                                                     | Ditto.                                                                                                                                                                                                                                                                                              |
| 6   | Muddaruk, .....           | 760      | ..                       | ....                                                                                                                                                                     | Ditto.                                                                                                                                                                                                                                                                                              |
| 7   | Bhyramund, .....          | 781      | Son.                     | ....                                                                                                                                                                     | Ditto.                                                                                                                                                                                                                                                                                              |

| No. | Names of Sultans.        | Date.    | Relation to predecessor. | Events in the Gukkur Annals.                                                                                                                                                 | Parallel events.                                                                                                                                                           |
|-----|--------------------------|----------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8   | Nuzzur,.....             | A.D. 802 | Son.                     | ....                                                                                                                                                                         | Empire of the Khalifs.                                                                                                                                                     |
| 9   | Kalib, .....             | 823      | Son.                     | ....                                                                                                                                                                         | A.D. 820. Khorussaun and Transoxiana separated from the Khalifat under the Tahirites.                                                                                      |
| 10  | Dowlut,.....             | 844      | Son.                     |                                                                                                                                                                              | A.D. 872. The Sofarides.                                                                                                                                                   |
| 11  | Soottan Khaun, .....     | 865      | Son.                     | Cashmere reduced to obedience; Thibet wrested from him by the Chinese. Monowurooddeen of the Chuk tribe compelled to give his beautiful daughter Dillahn to Furkh or Ferokh. |                                                                                                                                                                            |
| 12  | Kawb, .....              | 886      |                          | ....                                                                                                                                                                         |                                                                                                                                                                            |
| 13  | Ummir, .....             | 907      | ..                       |                                                                                                                                                                              | A.D. 903. The Sofarides lose all but Scistan, which they retain until about A.D. 1000.                                                                                     |
| 14  | Ferokh, .....            | 928      | Son.                     |                                                                                                                                                                              | A.D. 903. Rise of the Samani dynasty, which had more connection with India.                                                                                                |
| 15  | Yezdahd or Ulladahd,.... | 949      | ..                       |                                                                                                                                                                              | A.D. 961. Ulpteghin rebels and founds a separate kingdom at Herat, Bulk and Scistan.                                                                                       |
| 16  | Khyrooddeen, .....       | 970      | ..                       | Retained possession of Cashmere which may mean either that he lost the rest of his realm, or that Cashmere was lost after him.                                               | A.D. 977. Subukteghin succeeds, is invaded by Jypaul Raja of Lahore, invades Jypaul who is aided by the Rajas of Delhi, Ajmir, Kalinga, Kanoj, but is defeated at Lughman. |

|    |                         |             |      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----|-------------------------|-------------|------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 17 | Gohr Gunj, .....        | A.D.<br>991 | ..   | .... | A.D. 999. Maemood of Ghuzni commencing his reign. A.D. 1000, defeats Jypaul of Lahore near Peshawur, and storms and plunders Batenda Trans-Sutlej. 1000. Reduces the Raja of Bhuttia south of Mooltan. 1004. Defeats the Afghan chief of Mooltan near Peshawur. 1008. Defeats the united armies of the Hindus and Gukkurs near Peshawur, after having nearly lost the battle to the Gukkurs 30,000 in number. Plunders the temple of Nuggurkot or Joalla Mookki. A.D. 1011. Plunders Ghaunaesur. 1017. Kanoj submits, Muttra plundered. 1023. Lahore annex to Ghuzni. 1024. Plunder of Sonnath. 1030. Muksood ascends the throne, struggles with the Seljuks and dies A.D. 1040. |
| 18 | Noorooddeen, .....      | 1012        |      |      | A.D. 1035. Rise of the Seljuks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 19 | Mirdahd or Moorahd,...  | 1033        |      |      | Seljuks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 20 | Bukhtiarr,.....         | 1054        | Son. |      | Ditto.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 21 | Auzum or Aam, .....     | 1075        | Son. | .... |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 22 | Soomund, .....          | 1096        | Son. |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 23 | Kurraub or Myraub, .... | 1117        | Son. | .... |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 24 | Roostum, .....          | 1138        | ..   |      | Cashmere lost—Cabul, part of Hazara, the Sinde Sagur Doab to Mittunkote retained. An expedition against Cabul. Roostum a great warrior murdered at night in an insurrection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



| No. | Names of Sooltans.                            | Date.     | Relation to predecessor. | Events in the Gukkur history.                                                                                                                                                    | Parallel events in Asiatic history.                                                               |
|-----|-----------------------------------------------|-----------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 25  | Tillochun Shah, .....                         | A.D. 1159 | ..                       | ....                                                                                                                                                                             | A.D. 1153. Fall of the Seljuks.                                                                   |
| 26  | Muddud Shah, .....                            | 1180      | ..                       | ....                                                                                                                                                                             | A.D. 1157. Ghyasooddeen founds the Muhammadan empire in India.                                    |
| 27  | Jehan Shah, .....                             | 1201      | ..                       | ....                                                                                                                                                                             | A.D. 1179. Gukkurs aid Khoosroo Mullik successfully against Ghyasooddeen.                         |
| 28  | Rutfun Shah, in some list<br>Zyne Shah, ..... | 1222      | ..                       | ....                                                                                                                                                                             | A.D. 1186. House of Ghuzni expelled the Punjaub.                                                  |
| 29  | Gukkur Shah, .....                            | 1243      | ..                       | Buried at Cabul where is his Zearut or Shrine. After him Cabul and Peshawur were seized by the Ummir Timoor and became the property of the Tehogutta (Zagatai) family.           | A.D. 1191. Shahabooddeen and army routed at Thaneswar by the Hindoos under Pritwi Rajah of Ajmir. |
| 30  | Baz ali Khaun, }<br>Bijli Khaun, }            | 1264      | Son.                     | Conquered the Dhoond and Sutti mountains, taking as hostages the daughters of those tribes. Dwelt for security at Dhahngulli. Conquered the inhabitants of Kuk, Kaloo and Kybri. | A.D. 1193. Shahabooddeen defeats the Hindoos and takes Delhi, Ajmir, Koel, Kanoj, Benares, &c.    |

1195. Another irruption of Shahabooddeen into India. Muhammad Ghorî defeated in Khaurizm. The Gukkurs take Lahore and devastate the Punjaub. Muhammad Ghorî recovers Mooltan, and converts the Gukkurs to Islam. The Gukkurs enter Muhammad Ghorî's tent on the Indus at midnight, and murder him, March 4, 1206. A.D. 1206 Kootubooddeen king of India, Muhammad Ghorî king of Ghor. Eldoz of Ghuzni. Nasirooddeen of Mooltan. A.D. 1215 Ghuzni taken by the king of

Khaurizm. A.D. 1211. Shumsooddeen, A.D. 1217. Irruption of Chenghiz Khaun. A.D. 1221. Expelled king of Khaurizm, makes alliance with the Gukkurs and takes Sinde. Then goes to Persia and takes possession, is slain in Mesopotamia. Altumsh invades Mooltan and takes it. Nusirooddeen drowned in the Indus. Altumsh reduces all India to subjection, dies A.D. 1236. A.D. 1236 to 1240. Ruknooddeen, Sultana Rezia, Moizooddeen. Irruption of Moguls into Punjab. A.D. 1241 two other irruptions. Alaooddeen, and A.D. 1246 Nusirooddeen chastises the Gukkurs, places Sher khan as Governor of the Punjab, who takes Ghuzni. A.D. 1266 Ghyasooddeen. Moguls defeated in the Punjab A.D. 1280. A.D. 1286 to 1288. Keikobad. Authority much relieved under Julalooddeen. Defeats the Moguls in the Punjab. A.D. 1295 Alaooddeen. A.D. 1298 Mogul army defeated at Delhi, other Mogul inroads. A.D. 1317 Moobarik. 1321 Khoosroo,—here ends the Khiliji dynasty and begins that of Togh-luk in Ghyasooddeen. A.D. 1325 Muhammad Toghluk, Mogul irruption into the Punjab bought off. A.D. 1338 Malik Byram rebels in the Punjab. 1340, Afghans ravage the Punjab, and are succeeded by the Gukkurs. 1351 to 1388 Feerooz. 1385 to 1398 four kings of the Toghluk dynasty. 1398 Ti-moor Lungk takes Delhi. A.D. 1414 to 1450 interregnum. Then Behlool Lodi.

|    | <i>Soltan.</i>                         | A.D. |
|----|----------------------------------------|------|
| 31 | Mapaul, .....                          | 1285 |
| 32 | Mózum or Môm, .....                    | 1306 |
| 33 | Ashi or Ghazi, .....                   | 1327 |
| 34 | Raj Khaun or Rah Khaun,                | 1348 |
| 35 | Lukkun, .....                          | 1369 |
| 36 | Sippehr Khaun or Sheer<br>Khaun, ..... | 1390 |
| 37 | Mungk Khaun or Munga<br>Khaun, .....   | 1411 |
| 38 | Lyhr Khaun, .....                      | 1432 |

| No. | Names of Sooltans.   | Date. | Relation to predecessor. | Events in the Gukkur history.                                                                                                                                                                                         | Parallel events.                                                                                                                                                                                                             |
|-----|----------------------|-------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <i>Sooltan.</i>      | A.D.  |                          |                                                                                                                                                                                                                       | A.D. The Punjaub re-annex to Delhi, under Behloul. A.D. 1524, Baber conquers the Punjaub. A.D. 1526, Baber takes Delhi and Agra. House of Timoor. A.D. 1530. Cabul and the Punjaub separated from India in Hoomaions' reign. |
| 39  | Kudd Khan, .....     | 1453  |                          |                                                                                                                                                                                                                       | Rise of Sher Khan. A.D. 1540. Defeat of Hoomaion who flies to Lahore and thence retires to Sind and afterwards to Marwar, thence to Umrkôt where Ukhbur is born                                                              |
| 40  | Mullik Goolia, ..... | 1474  |                          |                                                                                                                                                                                                                       | A.D. 1542. Hoomaion escapes to Seistan, thence travels to Herat. A.D. 1540 to 1545 reign of Sher Shah, killed by the explosion of a magazine. Sher Shah takes possession of the Punjaub and builds Rohtass, A.D. 1541.       |
| 41  | Bîr, .....           | 1495  |                          |                                                                                                                                                                                                                       | A.D. 1545, struggle of the sons of Sher Shah for the empire. Adil disappears. The contest however with Selim is maintained by aid of the Gukkurs and the Niâzi for 2 years.                                                  |
| 42  | Mullik Tatarr, ..... | 1576  |                          |                                                                                                                                                                                                                       | Selim Shah dies A.D. 1553, Adil Shah succeeds. Rebellions in the Punjaub. Ukhbur takes the Punjaub from the rebels, defeats the imperial army led by Hemu at Paniput A.D. 1556.                                              |
| 43  | Sahrung, .....       | 1537  | ..                       | Celebrated for his justice, dwelt at Dhangulli, espoused the cause of Hoomaion, and was slain by Sher Shah within sight of his palace. His skin was stuffed with chaff and exposed on the road side.                  |                                                                                                                                                                                                                              |
| 44  | Audum, .....         | 1542  | ..                       | On the return of Hoomaion Audum was required to give up half the Gukkur kingdom to Kummál son of Sahrung. Refusing compliance he was defeated and slain by the imperial army.                                         |                                                                                                                                                                                                                              |
| 45  | Kummál Khan, .....   | 1553  | ..                       | Lushkuri son of Audum escaping levied an army and slew Kummál Khaun near Furwala. Lushkuri received from the Emperor the country eastward of the Sohaun River. The western lands were bestowed upon the son of Kummál |                                                                                                                                                                                                                              |

|    |                         |      |    |                                                                     |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----|-------------------------|------|----|---------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 46 | Lushkuri Khan, .....    | 1574 | .. | Reigned over the Dhangulli or eastern division of the principality. | Khann. Thus the Gukkur dominion was sundered. | Hoomaioon resumes his reign, A.D. 1552. The Gukkurs betray the fugitive Kamran to Hoomaioon.                                                                                                                                                                                                                                                                                                                                                                                                            |
| 47 | Jullal Khan, .....      | 1595 | .. | Dug the tank at Kooroonta.                                          |                                               | A.D. 1557. Hoomaioon dies, Ukhbur succeeds. A.D. 1581. Mirza Kahim takes the Punjab. A.D. 1581. Is driven out by Ukhbur who recovers Cabul. A.D. 1587. Recovers Kashmir. The imperial army under Bir Bul and Zyn Khan defeated in invading Sohaut, A.D. 1586. A.D. 1605. Death of Ukhbur, Jehangeer. Prince Khoosroo takes Lahor. Is defeated by the imperial army at Lahor and captured at the Jelum. A.D. 1626. Mohubbut Khan Afghan seizes the Emperor at the Jelum. Noor Jehan rescues the Emperor. |
| 48 | Mymood Khan, .....      | 1616 | .. |                                                                     | ....                                          | A.D. 1627. Death of Jehangeer. A.D. 1658. Shah Jehan deposed by Aurungzeeb.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 49 | Ukhbur Kooli Khan, .... | 1637 | .. | Built or repaired the palace at Dhangulli.                          |                                               | A.D. 1707. Aurungzeeb dies after being engaged all his life in war with the Maharrattas. Bahadoor Shah.                                                                                                                                                                                                                                                                                                                                                                                                 |
| 50 | Moorád Kooli Khan, .... | 1658 | .. |                                                                     | ....                                          | A.D. 1675. Hur Govind, 10th king of the Sikhs, is driven into the mountains, A.D. 1711.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 51 | Ulla Dád Khan, .....    | 1679 | .. |                                                                     |                                               | A.D. 1712. Death of Bahadoor Shah. Jehandar Shah put to death A.D. 1713 by Farokhseer.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 52 | Dooloo Dilawur Khan, .. | 1700 | .. | His tomb is at Pullákur.                                            |                                               | A.D. 1716. Devastations of the Sikhs, who are defeated with slaughter, Farokhseer put to death. A.D. 1719. Muhammad Shah. Revolt of the Afghan Chief of Kusoor.                                                                                                                                                                                                                                                                                                                                         |
| 53 | Moowuzzin Khan, .....   | 1721 | .. |                                                                     |                                               | A.D. 1738. Invasion of Nadir Shah 1739.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 54 | Mookurrub Khan, .....   | 1742 | .. |                                                                     |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |



| No. | Names of Sultans.       | Date. | Relation to predecessor. | Events in the Gukkur Annals.                                                                                                                           | Parallel events.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----|-------------------------|-------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 55  | Shah Khan, .....        | 1763  | ..                       | Imprisoned by Raja Goolab Singh. Died in prison.                                                                                                       | <p>takes Delhi. A.D. 1747. Ahmed Shah crowned at Candahar. Occupies the Punjab, repulsed in his advance upon Delhi by Ahmed Shah of Hindoostan.</p> <p>A.D. 1748. Death of Muhammad Shah, Ahmed Shah.</p> <p>A.D. 1757. Second Doorani invasion. Punjab ceded to them.</p> <p>A.D. 1754. Death of Ahmed Shah. Aulungeer.</p> <p>Third invasion of Ahmed Shah Doorani who takes Delhi. Retires A.D. 1758 Ragoba Maharatta takes the Punjab and drives out the Dooranis.</p> <p>A.D. 1759. Fourth invasion of Ahmed Shah. Murder of Aulungir 2d.</p> <p>Ahmed Shah defeats and annihilates the Maharatta army at Paniputt.</p> |
| 56  | Raja Hyatoolla Khan, .. | 1808  | ..                       | Son of the above being released from the Jumboo prison by British interference, holds a very small Jaghir in Huzara, is about forty-five years of age. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Alexander's enlightened policy caused him to marry a daughter of Darius, and to persuade his followers to intermarry with the Persians. Thus in Persia the Greeks were naturalised and the two races were interblended. There can be little doubt that his successors in Baktria and Ariana pursued the same sound system. And thus we see Ferdoosi, the sole historian of Persia, take advantage of this intermixture of races, to represent Alexander as a native Persian and his conquest as a mere change of Sovereigns.

Now the family of Cyrus the Great (Kykheosroo) after their loss of the Empire, retired to the patrimony of Roostum in Sceistán where their descendants\* yet remain, and it seems probable that during the Parthian and the succeeding dynasties, this illustrious family ruled their own hereditary province as tributary Princes. But in any case, it seems likely that the Greek and Perso-Greek Princes of Ariana would ally themselves with a house so illustrious, and which the Persians had invested with something of a sacred character. This was a natural means of consolidating and perpetuating their authority. The issue of such an union, unable to derive themselves from Alexander (the only Greek whose name survives in their traditions) would inevitably trace their genealogy through the maternal stem, and claim to be offspring of the so-styled Kings of Kings. The amalgamation of the two races, would soon be as complete as that of the Normans and Saxons, whilst the name Gukkur may very well be a corruption of the name Grekoi. The Gukkurs it is true, suppose this name to be derived from one of their Sooltans, Gukkur Shah, whose tomb is at Cabul. But we read of the Gukkurs as powerful chiefs, bringing into the field 30,000 of the choicest troops as early as the age of Mahmood of Ghuzni, i. e. 400 years prior to the existence of Sooltan Gukkur Shah.

Let us assume a parallel instance, and suppose an obscure Captain of William the Conqueror's army to have succeeded to the throne

\* Two of them called upon the British Envoy at Herat in A. D. 1839 when I was Asstt. Envoy there. One of them Julalooddeen Khan was a man of remarkable personal beauty and stature; so much so, as to arrest general attention when he went abroad. Humza Khan, the eldest, was 7th in descent, since the family had been driven into Sceistan.

of Wales, intermarrying there with a royal bride Ap Shenkins, ap Morgan, Ap Jones. Let us suppose the descendant some hundred years afterwards to be driven out of Wales into some obscure island of his former kingdom, and there to set up a petty monarchy: who would venture to remind this new king of his descent from the obscure Captain de Vere? Bard and courtier would alike forget the intruder, and after histories of the royal house would record only the exploits of the illustrious Shenkins or of the immortal Jones.

Had not the Muhammadan faith uprisen to blot from the earth's bosom whatever was blessed in social or graceful in public life, we might still have Grecian or Páli histories of the fourteen centuries, now erased from the annals of the world. The monumental sculptures alone, would, like the coins, have presented an unbroken series in the history of the human mind; from the moment, when vigorous, matured and accomplished, it leapt into being, like their own virgin goddess, amid the blackness of an unarranged chaos; to its gradual obscuration and final barbarity, by amalgamation with surrounding night.

But a wide field of discovery and research is opened to us by our possession of the Punjaub. Here we stand upon a mine of buried relics at the very junction of the Grecian with the Rajpootre tribes. Here we have the probable birth-place of that Rám Chundre,\* who is the hero and progenitor of the most illustrious Hindu race. Coins bearing his effigy and name, abound in every deserted site. It was

\* The Sinde Sagur Dooab is full of traditions of Rám Chundre. He is said to have been born at Furwala, near Rawalpindi (afterwards the capital of a petty Gukkur Sooltaun) and to have wandered Southward to Rajgurbh, ploughing upon the road a gigantic furrow, from the Western foot of the Kurungli Mountain, which is to this day called Rama Hullana, or Rama's furrow, being in fact a cleft or chasm between two parallel strata of sandstone. Hindus object that Rám Chundre was from Aodia, or Oude. But the ancient Hindi name of Huzara and its Northern Mountains is Oodiana. And the singular disappearance from history of the kingdom of Aodia after the death of Raam, may well cause doubt, whether the modern Oude can be the birth-place of Raam. Although the author of the Ramayana may in ignorance of the geography of these parts, have adopted the Aodia best known in his day.

impossible not to perceive at a glance, that the figure of the horseman in the graceful ease of its outline had been derived from Grecian models; whilst the horseman's turban and physiognomy are precisely those of the Goojjur tribe, the oldest race in Huzara. But I had no hope of ever finding farther proof of Rám Chundre's connection with the Greeks until a silver\* coin was brought me, bearing his effigy on the one side, and on the reverse a Grecian legend.

This curious discovery served as a connecting link to a chain of circumstantial evidence, which has been gradually forming in my mind. The type of Rám Chundre was in use upon the coinage of the Punjaub, whilst Greek continued to be the language of the Court. Who then was this Rám Chundre? and was the fabulous demi-god here alluded to? or was Rám Chundre the name of the reigning King, since deified by the spirit of hero worship? Hindus reckon several Rám Chundres. The first was probably that Osiris who extended his peaceful conquest to the Punjaub. A colony planted by him was found by Alexander in the country between the Indus and the Loondi River. The town of Leeia on the Indus yet bears his name. At the festival of the Rám Leila, a festival undoubtedly established by him, all the emblems of the Bacchanalian revels are still preserved. And Arrian remarking upon the fact of Alexander's fleet being followed by the Indians along the Hydaspes with song and dance, observes that Indians have been lovers of the song and dance beyond all others ever since they revelled with Bacchus on Indian land.

But besides this Rám Chundre whose name Rám Iswa or the Lord Rám is so remarkably like Rámeses, as to cause doubt whether Osiris and Rámeses were not one, there was at least one other Rám, whom Hindus are careful not to confound with the first. The birth-place of this Raam was Aodia,† a name at the present day applied almost exclusively to Oude: but formerly the Northern por-

\* See No. 11, of the Plate.

† The Ayodia which was the birth-place of Raam the Conqueror is merely mentioned as such in the Puranas, and does not again appear in Hindu history. It is probable therefore that it was not then a very considerable place, however extolled by Hindu poets of after days. Raam is stated to have conquered the Dekkun, i. e.



tion of the Sinde Sagur Dooab or land, included between the Indus and Hydaspes was called Aodiana. In this land the commonest\* silver coin of antiquity is, that which bears the effigy of the hero or king Raam, and on the reverse a bull seated, with an inscription in Sanscrit, varying on different types. On one it is

Asawrari Sri Samagu Dewa,

or steed of his excellency the god Shib—an inscription which may have led to the fable which confounds Shib with Rama. On other coins occurs in the same place, the inscription

Sri Raam Poodup,

the seal of his excellency Rám, or the seal of the wife of Ráam or power of Raam:—whence first this class of coins were called Sítla Rami, a name which has been extended to the whole of the Baktro Greek series by the natives.

On other types it is

Sri Raam Oodye—Sri Ráam's effulgence.

On others

Sri Ráam Numma, or service to Sri Ráam. On others Madána pála deva, the god, cherisher of the world.

Now, where the bull is called the steed of his excellency Shib, it is manifest that Shib and the horseman are two distinct personages, otherwise the bull and not a horse would have been mounted. The horseman therefore is in all probability as in other Indo-Greek coins the reigning monarch: and if so, the inscription, the seal of Sri Rám will imply that such was the monarch's name. If the horseman be other than the reigning monarch, it is a deviation from the system observed in the series of coins to which it belongs.

Now it is singular, that whilst the land producing this coin is called Aodiana, and whilst local tradition every where breathes of

the Southern country. But Elphinstone observes that he could not have conquered what we now call the Dekkun previous to the compilation of Menu's Institutes, for that then no Hindu occupied those countries. Supposing that he had been born in the Sinde Sagur Dooab according to local traditions, he would have conquered the Dekkun or South country in conquering Central India or Rajpootana. In the Sinde Sagur Dooab on the right bank of the Jelum, are the ruins of an ancient town called Oodinugr.

\* See Nos. 10 and 13 of the Plate.

Rám Chundre, who is the Heri or Hercules of the Hindu, there should turn up a coin, having this horseman on one side, and on the reverse a Greek inscription, of which two words are beoh, and Erak lirè 'Ηρακλirε, and that where these coins occur, there should be an old fort upon the Indus above Umb, called to this day Behoh, founded by a Kawfur, i. e. a person of antiquity who with his brother Rám (according to local tradition) reigned along the Indus, from Behoh to Atuk.

It is singular also, that the only pure Rajpootre race of India dwelling in Rajpootana have architecture similar to that which is dug out of the ruins of Greek cities in the Punjaub, and which is no where else known in Asia, if we except Cashmere, where the Greeks reigned, as evidenced by their coinage.

It is remarkable also, that whilst Greek historians mention the divisions of Hindus into castes, and that in battle they bore upon a standard the effigy of Hercules, none of them mention the very remarkable circumstance of one of those *classes* deriving itself from Hercules. That they were not struck with this remarkable division of the community which is so far superior to the rest. That yet they should mention the Σιβι (Sibi) or Chibbs (also Rajpootres) as being of Heraklean descent, as evidenced by the use of the club, the dress of hides and the impression of a club upon their cattle. The Kshettri or Khettri division may not then have derived itself from Rám. May not then have borne the proud title of Rajpootre or royal blood. The Rám who carried Southward from Aodia his victorious arms may not then have appeared. The Rajpootres at present found in the Punjaub (the Chibbs perhaps excepted) all appear to have come from the South.

May not then this coin be the currency of that Ram Chunder who conquered from Aodia to the Southward and founded the Rajpootre race? If so, he was probably an Indo-Greek as implied in the Greek and Sanskrit inscriptions, and then the superiority of the Rajpootre of central India to all other Indian races in beauty, valor and virtue—his startling resemblance in feature, figure and dress to the Greek mountaineers (to which I can bear personal testimony) and his use of the architecture and sculpture peculiar otherwise to Indo Greeks, are all accounted for.

In his history of Marwár, Tod derives the Rahtore Rajpootres from a Yavan (Greek) king of the Aswa tribe called Yávánaswa of Parlipoor in the North. Yet the author himself styles this, "Scythian ancestry."\* The word Parlipoor should probably be rendered Pálipoor, and may have been used by the vulgar to designate the capital of the country, in which Páli was spoken.

In like manner the royal family of Mewar, the purest of the undescended race, derive their origin from Nowshirwan who ascended the throne of Persia, A. D. 543. It is manifest therefore, that their genealogical rolls, beyond that period at least, are pure fictions, and that they have been Rajpootres no more than 1300 years.

It is a remarkable circumstance that in a list of kings of the Solar line following Vikramaditiya, with which an intelligent pundit of Huzara furnished me, the 8th in succession after Vikramaditiya, is Ram Chunder, who therefore ought to have flourished about A. D. 111 or 438 years after the Macedonian invasion, a period at which, it is certain from the remaining coins, that the Grecian character was in use.

I give this list, although I do not know its history.

After Vikramaditiya—Sooruj bunses.

1. Equoikoo.
2. Kurn Raja.
3. Urjun Paul, his son.
4. Raja Shah or Gur Kotarr, his son.
5. Syj Indur, his son.
6. Nonungh Daiv, his son.
7. Rám Singh, his son.
8. Rám Chunder, his son.
9. Meidun Mull of whom Midnapoor.
10. Urjun Deo, his son.
11. Roodur Moon of whom Orissa.
12. Bhurt Chund, his son.
13. Mudkur Shah, his son.

\* He perhaps alludes to the "aswa," the Sanskrit for horse. But by the change of a single letter aswa becomes "iswa," "Lord," which appears to me a more probable reading. Lord of the Yavan or Greeks.

14. Rám Suha, his son.
15. Runsoor, his brother.
16. Run Sing, ditto.
17. Ruttun Syne, ditto, imprisoned by Sooltán Julal-  
ood-deen.
18. Indurjeet, in Sunbut 1688.
19. Runjeet.
20. Bír Singh.
21. Bharut.
22. Raja Maun Singh.

It would not however, suit the limits of a preface to pursue the question further. If the suggestions be sound, they will be taken up by men of greater erudition, who have leisure and the means of reference to books. I would however observe that bare lists of sovereigns, extending back four or five thousand years, without a single incident of history, or a hint by which to test their accuracy in comparison with parallel events in the history of the world, can be valuable only, when consonant with known phenomena. That nothing is more easy than to fabricate such lists and that nothing can be more probable than that bards and priests should fabricate them in support of their own theories and for the gratification of the vanity of those in power.

Let us now turn our attention to the favourite hero of the Punjaub Raja Russaloo son of Sala Byne or Salbyn or Salivahana, whose capital was Sialkót, one of the oldest cities of the Punjaub, held by the Pooroowar dynasty. I have in a former number of the Asiatic Journal offered a list of the Rajahs of Sialkót as recorded in a MS. which I there procured, I offer it again for convenience of reference.



|    | Rajas of the Pooroo-<br>warr family who have<br>reigned at Sialkôt, and<br>their successors. | Traditionary length<br>of reign. | Dates given by the<br>foregoing column. |       | Dates reckon-<br>ing 22<br>years to each<br>reign. | The same calculat-<br>ing back-<br>ward<br>from Maimood of<br>Ghuzni. |  |
|----|----------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------|-------|----------------------------------------------------|-----------------------------------------------------------------------|--|
|    |                                                                                              |                                  | A. D.                                   | A. D. |                                                    |                                                                       |  |
|    | Brlum to Sâ'âbyn,                                                                            | 2000                             |                                         |       |                                                    |                                                                       |  |
| 1  | Sâ'âbyn from Sunbut<br>137,.....                                                             | 90                               | 81                                      | 81    | 546                                                | Ascended the throne 137 of<br>Vikramaditiya.                          |  |
| 2  | Russaloo, his son, ....                                                                      | 45                               | 171                                     | 103   | 568                                                |                                                                       |  |
| 3  | Hôdi,.....                                                                                   | 52                               | 216                                     | 125   | 590                                                |                                                                       |  |
| 4  | Burjial,.....                                                                                | 62                               | 268                                     | 147   | 612                                                |                                                                       |  |
| 5  | Jypaul,.....                                                                                 | 72                               | 330                                     | 169   | 634                                                |                                                                       |  |
| 6  | Munnipaul,.....                                                                              | 62                               | 402                                     | 191   | 656                                                |                                                                       |  |
| 7  | Mookundurpaul,.....                                                                          | 57                               | 464                                     | 213   | 678                                                |                                                                       |  |
| 8  | Biddehpaul,.....                                                                             | 38                               | 521                                     | 235   | 700                                                |                                                                       |  |
| 9  | Kishenpaul,.....                                                                             | 59                               | 559                                     | 257   | 722                                                |                                                                       |  |
| 10 | Bynepaul,.....                                                                               | 92                               | 618                                     | 279   | 744                                                |                                                                       |  |
| 11 | Kusspaul,.....                                                                               | 62                               | 710                                     | 301   | 766                                                |                                                                       |  |
| 12 | Runjeetpaul,.....                                                                            | 88                               | 798                                     | 323   | 788                                                |                                                                       |  |
| 13 | Runbeerpaul,.....                                                                            | 34                               | 886                                     | 345   | 810                                                |                                                                       |  |
| 14 | Dunpaul,.....                                                                                | 53                               | 920                                     | 367   | 832                                                |                                                                       |  |
| 15 | Urjunpaul,.....                                                                              | 49                               | 973                                     | 379   | 854                                                |                                                                       |  |
| 16 | Luchmipaul,.....                                                                             | 79                               | 1022                                    | 401   | 876                                                |                                                                       |  |
| 17 | Goorditpaul,.....                                                                            | 46                               | 1101                                    | 423   | 898                                                |                                                                       |  |
| 18 | Diapaul,.....                                                                                | 63                               | 1147                                    | 445   | 920                                                |                                                                       |  |
| 19 | Soorutpaul,.....                                                                             | 48                               | 1210                                    | 467   | 942                                                | Here ends the Rajpootre<br>dynasty.                                   |  |
| 20 | Sunnunpaul,.....                                                                             | 47                               | 1258                                    | 489   | 964                                                |                                                                       |  |
|    | Ferokhmah,.....                                                                              | 35                               | 1305                                    | 511   | 986                                                |                                                                       |  |
|    | Maimood of Ghuzni, ..                                                                        | 9                                | 1340                                    | 533   | 1008                                               | Died A. D. 1030.                                                      |  |

The columns added to this list of kings will show at a glance the points in which it is open to question. Calculating twenty-two years to each reign the entire list brings us to the death of Sooltan Maimood of Ghuzni in A. D. 565 instead of A. D. 1030, showing a discrepancy of 465 years. Pundits defend this by saying that under the name of each monarch we are to understand the entire dynasty. But this will not bear the light; for not only is each (in the copy I possess) styled the son of his predecessor; but a succession of twenty dynasties in the space of 1198 years is a phenomenon without precedent. It may perhaps be more correct to infer that the names of remarkable sovereigns alone have been recorded.

That the Salabyne of Sialkôt and the Salivahana whose era is current in the Indian Peninsula are identical admits of no doubt; for the assigned dates of their respective reigns agree within three years. Salivahana being, according to Elphinstone, A. D. 78 and Salabyne according to my MS. 81.

We may therefore with some security adopt the traditionary era of Russaloo, son of Salivahana, as A. D. 171, or the 453rd year after the conquest of the Punjab by Alexander. This was about the era of the introduction of Boodhism into the Punjab; to judge by the coins found in topes.

Those topes, in the traditions of the country are always associated with the great enemy of Russaloo, viz. the Rakuss. Upon the Bullur Tope he is said to have sat. Raja Srikup the other enemy of Russaloo is associated in tradition with the Tope of Maunkyala and has a tope of his own near the ruins of his palace in Pukli. The contests therefore of Russaloo with the Rakuss may figure the strife between two religions; the Boodhist faith on the one hand, and the Hindoo or the Christian\* faith on the other. Or it may denote merely the struggle of two distinct races, the Hindoo and the Scytho-Greek.

The Rakuss, Rakush or Rukshasa, is represented as a gigantic monster in the human form, having a certain degree of command over the elements, but amenable to death in a violent form. The number of the race is variously recorded; but the most general tradition gives four brothers and a sister. Their chief haunts were Gundgurrh and Alooili of Huzara, but they brought upon themselves the vengeance of Russaloo by their depredations at Lahore, then called Oodinugri. Establishing themselves in the forest westward of that city, they daily demanded a human victim to be devoured by them. Russaloo's battles with these monsters, are the most favourite theme of the bards of the Punjab.

As in Persian history the white Scythian invaders of the empire are believed to be figured under the type of the Deeve Sofaid or white Demon, so the introducers of a creed, monstrous in the eyes of Bráhmans, may have been held up to detestation under the title and attributes of the Rakuss. That the Grecian colonists of the Punjab were eventually converted to this creed we have reason to believe from the continuance of Grecian inscriptions upon the coins of the country, after the appearance upon them of Boodhistic emblems.

\* See, farther on, Salivahana's connection with emblems of the Christian religion.

The size of Russaloo's foes is no doubt enormously exaggerated; but it seems to me that the tradition of their gigantic stature, may have had some foundation in fact. For a coin\* is common in Huzara and the trans-Indus territory, which must have been struck by some king almost coeval with Russaloo, having on one side the figure of a giant astride upon an elephant, which shrinks to a mere pony beneath him; he being astride not upon the neck, but upon the back of the elephant—a posture impossible to a being of human bulk. The reverse is sometimes a figure of Ceres, or of plenty, with the cornucopia. At others, it is that of a man who has just struck with one fist, and has drawn back the other to repeat the blow. This figure is also probably intended to represent a giant. At other times the reverse exhibits the four-armed figure occurring upon some of the coins of Kanerki. At others it is a figure facing the East and either sacrificing or obtesting. At other times it is a giant leaning on a trident. The legend, which is always in Greek characters, is seldom legible, owing partly to the character having become barbarised, partly to the effects of weather upon the copper: but more especially to the discordance between the Greek character and the foreign name or word recorded.

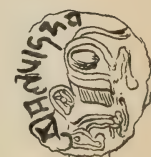
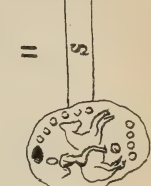
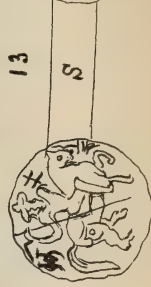
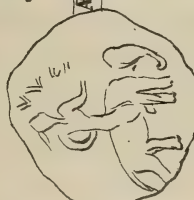
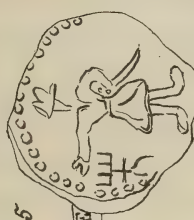
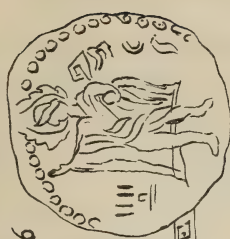
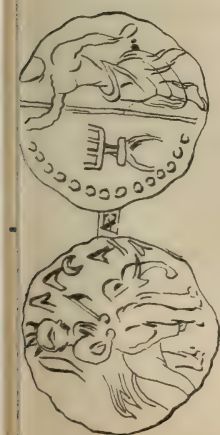
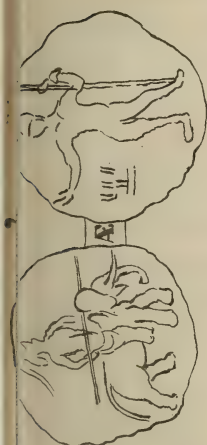
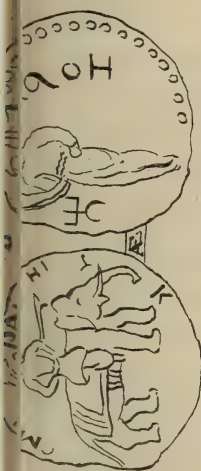
Upon one in my possession however I can distinctly decipher the word or name Αλοολι, Alooли, which, as above stated, is an old mountain site in Huzara, a reputed haunt of the Rakuss, where according to some of the traditions, one of the monsters was slain by Russaloo. This site was very possibly named after the king or ruler who struck the coin in question. The elephant-strider is most probably his image.

This choice of a site in the mountains so strong as that of Alooли, denotes that the plain was not safe for him, and is in keeping with the whole tradition of Russaloo's contests with the Rakuss.

The coin belongs to the Scytho-Greek series, and appears to follow immediately after those generally attributed to Baraoro, if we may judge by the types and execution. The name Rakuss is claimed by Sungserit scholars as a corruption of Rukshasa. But I know no reason why the Hindoos may not have borrowed it from the Greek verb “*ῥακόω*” (to rend, tear), or why it may not be com-

\* See Nos. 1, 2, 3, 4, 5, 6, 7 of the Plate.





13

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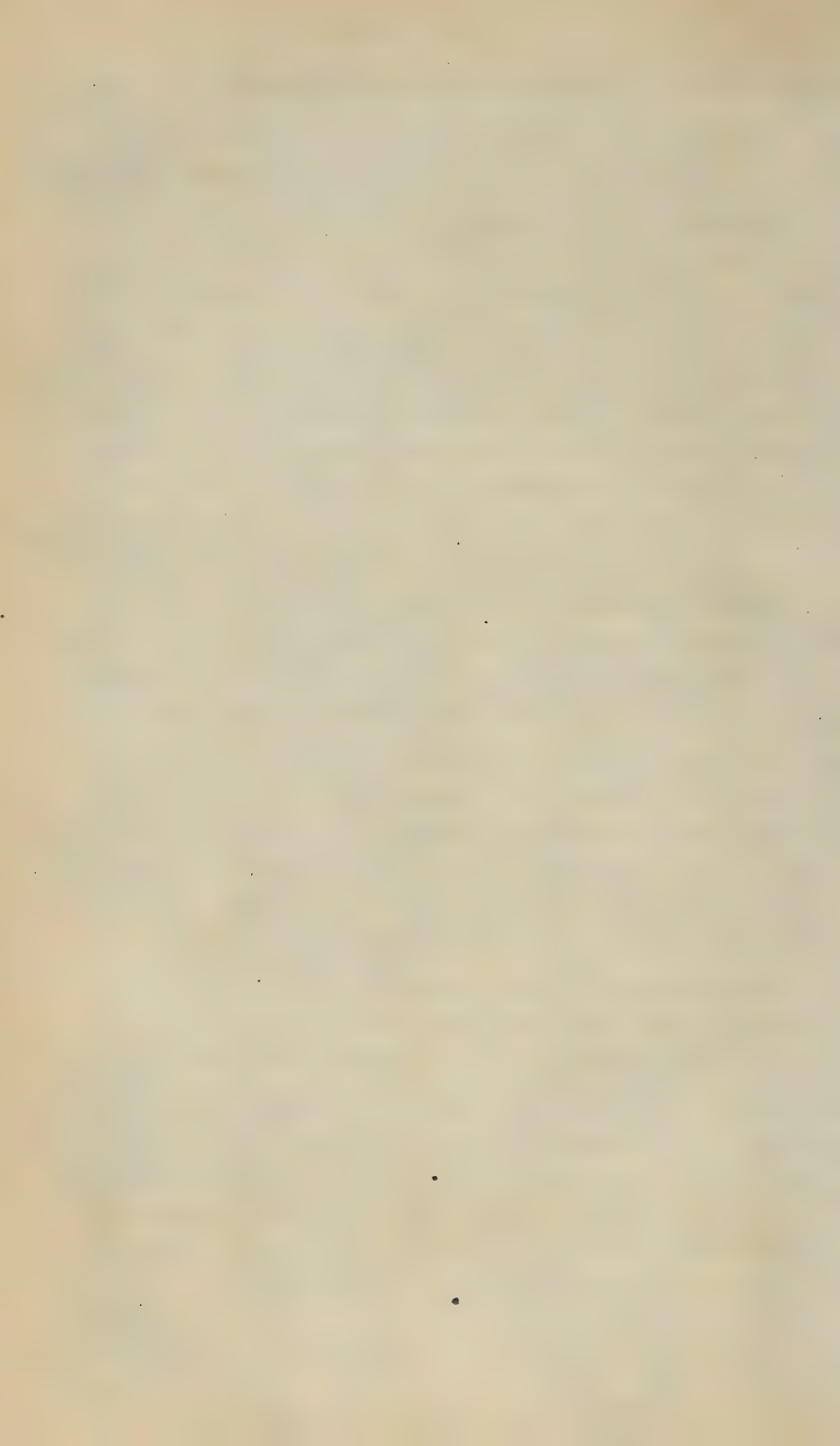
7

6

5

4





pounded of the Persian words *را* and *کشیدن* or *کشتن* the dragger or murderer of the highway. In one of the coins of the preceding series, if indeed it belong not to the same era, is the wild figure of a man, casting what appears to be a net. This method of entangling an enemy was known to the ancients: and the Thugs long had the credit of practising it upon their victims.

The elephant-strider coin appears to me to belong to several successive reigns, the type gradually growing more barbarous. This would be the case whether the image represented were the figure of the reigning ruler and his gigantic descendants, or whether it were that of a monster slain by the founder of the dynasty. The strider of the elephant bears sometimes a spear in rest, sometimes only the Ankoh or iron-hook used for driving the elephant, he has the fillets of royalty and sometimes what appears to be a horned helmet. The figure in reverse, burning incense or obtesting, wears top boots and an English hunting-coat buttoned. Sometimes he wears a turban. The figure of the reverse leaning upon a trident is naked to the waist; after which appears the dhotie of Hindustan, a single cloth hanging in profuse folds about the loins. There is nothing in these coins savouring of Buddhism, excepting the place they seem to hold in the Buddhistic series. The characters are Greek. The head-dress is Persian, the coat and boots are of Europe not of Tartary. The trident\* which oriental scholars are so fond of attributing to Sheov, although he stole it from Neptune, is essentially Greek; as is the figure of Ceres with her cornucopia. The language most nearly approaches to the ancient Persian. The frequent occurrence of *Ra* seems to allude to the *Ra* of Egypt; the sun-god worshipped there, throughout Persia and eastward to the Jelum, and taken up in Hindustan under the slightly modified name *Rám*. On some of the coins *Ardókro* may be almost decyphered. In the Ceres type occurs the word *Agôthl* or *Agothkhr* if I read aright the barbarised characters *ΑΓΘΘΛ* (the rest defaced) *ΑΓΘΘΧΡ*. On another type appears the word *POAO* or *ROAO*.

\* The trident first appears in coins of Mauas or of Azas, when it serves for sceptre to the King who, as Neptune, stands upon the ocean, his right foot resting on his submerged foe. All succeeding appearances of the trident must be regarded as derived from this type.

The series of coins which commences apparently with the reign of Kadphises and of which specimens are generally found in topes, have all the same characteristics ; they are rather Greek than Asiatic, rather Persian than Tartar, rather belong to the religion of Zoroastrianism than to that of Buddhâ. The inscriptions are in the Greek character. We have full length figures of Hercules, denoting Hellenic descent, which Alexander boasted in common with many Greeks. We have his club, denoting the same consanguinity.\* We have the trident of Neptune, the especial deity of the Greeks, who were no doubt as proud as are Britons of their empire of the deep. We have the figure of Europa seated upon an Asiatic Bull to represent the union of Europe and Asia in this line of kings ; and we have the incense altar of Greece, upon which Alexander delighted to burn incense whenever he crossed a river or captured a fort, or entered a considerable city ; and we have the cornucopia in the grasp of Ceres.

On the other hand, the names or words recorded in Greek characters savour often rather of the ancient Persian, and of the deities worshipped by that race, as if the close intercourse of centuries and intermarriage with Persians had influenced the religious tenets of the Arianian kings. Such are the words Mithro, ΜΙΘΡΟ Athro, ΑΘΡΟ, Okro or Ardokro, ΑΡΔΟΧΡΟ, Korano, ΚΟΡΑΝΟ, the last being probably derived from the Pehlivi name of the sun خور which gives name to the provinces of Khorussaun and of Khorism. Whilst ΗΑΙΟC Helios, the Greek name of the sun, has the same reference with all the foregoing, to the worship of that luminary and of his element fire.

\* Ἐν τε αὐτῇ τῇ Ἰνδῶν γῇ (he has just been speaking of Mount Meru) βούς ῥόδοντας ἐγκεκαυμένας ῥόπαλον, τεκμηριῶσθαι ἐπὶ τῷδε, ὅτι Ἡρακλῆς ἐς Ἰνδοὺς ἀφίκετο. Arrian, lib. v. cap. 3.

Τῶν δὲ κοινωνησάντων αὐτῷ τῆς στρατείας ἀπογόνους εἶναι τοὺς Σίβας σύμβολα τοῦ γένους σώζοντας, τό, τε δορὰς ἀμπεχέσθαι, καθάπερ τὸν Ἡρακλέα καὶ τὸ σκυταληφορεῖν, καὶ ἐπικεκαῦσθαι βουσί καὶ ἡμιόνοις ῥόπαλον. Strabo. lib. xv. p. 688.

It is curious that the cypher of the Sikh Government stamped upon their public cattle, was not exactly a club, but a trident (trisul) which seems to have come down from the Greeks to them as an emblem of sovereignty. Their turban also is moulded into the Greek helmet ; and like the Spartans, they are sworn to arms.

Nevertheless the appearance of these coins in Buddhistic topes renders it highly probable that Buddhism had been extensively adopted when those coins were struck, and leaves not a doubt that it prevailed whilst the coins were yet current.

If we go back to the first coin of the Scytho-Greek series, that of Kadphises, it is impossible to resist the conviction that it was the work of fire-worshippers. In many of the golden coins, the principal figure has a pyramidal helmet, i. e. a helmet shaped like a flame of fire, and a flame of fire issues from the helmet. A flame also rises from either shoulder. He is pointing down to an altar and looking up, sometimes with the left arm akimbo, at others resting it upon a trident, and manifestly demonstrating the necessity of the worship he inculcates. His features are Turkish, his dress is that of Bokhara, and Bulkha the land of Zertoosht, when indeed he is not clad in Grecian mail. He has the club of Hercules denoting Heracleian origin, and the trident, as descendant of the rulers of the waves. He has sometimes\* the Ram's horns as Amun Ra or Amun Helios, not of Egypt but of Greece.† These horns appear in old coins of Alexander, but were not adopted by any of his successors in Ariana. Upon the coins are the legends ΒΑΣΙΛΕΥΣ ΟΟΗΜΟ ΚΑΔΦΙΣΗΣ. ΒΑΣΙΛΕΥΣ ΒΑΣΙΛΕΩΝ ΜΕΓΑΣ ΟΟΗΜΟ ΚΑΔΦΙΣΗΣ. ΒΑΣΙΛΕΥΣ ΒΑΣΙΛΕΩΝ ΚΩΤΗΡ ΜΕΓΑΣ ΟΟΜΗΝ ΚΑΔΦΙΣΗΣ. ΚΟΓΚΟ ΚΟΖΟΥΛΟ ΚΑΔΦΙΖΟΥ.

But it is certainly not the figure of Kadphises that is sacrificing. For we have the head of that monarch upon other coins exhibiting purely Greek traits, and not at all resembling in any particular the full length portrait.

It seems to me highly probable that the full length figure represents Zertoosht, and that Kadphises introduced the system of that sectarian into his dominions. There is as yet nothing savoring of the Buddhistic doctrines. But they seem to have sprung out of

\* See No. 9, of the Plate.

† The Greeks seem to have been mistaken in attributing the ram's head to Amun. It more properly belonged to Kneph. But they could not have fallen into this error unless the two Deities had been in their day confounded together by the Egyptians themselves. See Bunsen.



the worship of fire, or to have rapidly succeeded. For before the types of this series of coins are quite effaced, we find the king flourishing, in lieu of a sceptre, the Buddhistic rattle.

It is I know the fashion to consider Kadphises as a barbarian, i. e. an Asiatic and not a Greek. But this surmise appears to me to have little foundation, Greek could never have been the language of Ariana, for we have almost no traces of its existence in the dialects of the Asiatic provinces of that empire. It could have been only the court language, and must have been unintelligible to the mass of the people. Why then should Kadphises, if not of Grecian descent, have adopted it? and why should he have clung with such tenacity to Grecian emblems? It is highly probable I think that he was of Greek descent, born in Bulk or its neighbourhood, and that he conquered Cabul and the Sind Sagur Dooab. In that case he might naturally have dropt the Pali, as being unintelligible to him, and have preserved only the Greek characters in his inscriptions.

Then follows the question, What is the origin of Boodhism? Is there any monument of that worship which can with certainty be traced to a period antecedent to Christianity? Are we not justified in regarding Egypt and Assyria as the nurseries of the worship of fire, with which was associated the doctrine of the good and the evil principle? Are we not justified in considering the pyramids as the original type of topes and dagobas of whatever kind? If the latter surmise be sound, the course of Boodhism was from North-West to South-East and the earliest topes are those of Cabul. Yet from none of these topes have coins been found of earlier date than the second century of our era, although Sakhya Muni the supposed founder of Boodhism, is generally believed to have flourished three or four centuries before Christ, and although in the 7th century, the Chinese traveller Hiang Tsang mentions dagobas at Julalabad and Peshawur built by Asoka, who is supposed to have reigned in the third century before Christ.

When the doctrine of Christ was first preached to the world, the prevalent eastern philosophy was that of the Gnostics, which pervaded Egypt and Syria, and being closely allied to the religion of the Magi, was probably also prevalent throughout Persia. We need

only to lay side by side the doctrines of the Gnostics and those of the Boodhists, to be convinced that they have a common origin, or that the one is derived from the other.

According to the Boodhist, Adi Budha, the supreme, self-existent God, infinite, eternal, without members or passions, dwelling in unbroken peace and in unbounded happiness, conceiving the desire to create, brought into existence five Dhyani Boodhas, or Divine intelligences, each of whom produced a son or Boodhisatwa. These were the actual creators of the universe, its preservers and destroyers.

The soul is part of the essence of Adi Boodha or the Almighty, allied to the material creation by misfortune and error. (How misfortune or error could happen to the Almighty is not explained.)

Adi Boodha although acknowledged as God, is never worshipped.

By abstinence from evil and meditation upon God, the soul is at length freed from its union with the flesh, and reunited to the Almighty.

There is a heaven for those who free themselves from the evil.

A hell for those who remain unfreed.

According to the Gnostic. The supreme self-existent God, infinite, eternal, without members and without passions gave forth a succession of emanations from himself called *Æôn* (*Αἰών*.) These acting upon matter which was eternal, but lay in a state of chaos, reduced it to order, and thus the universe had being. The *Æôn* who effected this was the *Demiurgos*. As Lord supreme of matter, he is at variance with the supreme spirit; and it is the triumph of spirit over matter which is to restore the spiritual nature of man to the *Pleroma* or heaven of the Almighty spirit.

According to the Manichæans, a branch of the Gnostics, Manes (perhaps the Munnoo of the Hindoo and the Mani or Mooni of the Boodhist) was the Comforter promised by our Saviour, when he left his disciples in despair at his loss. The Boodha closely assimilates to this character. He was a messenger from heaven. Not a God. Nor yet a mere man. A comforter and a teacher—but not an object of worship. The Hindoo Pundit if asked to describe the Munnoo says, “The Munnoo is neither God nor man. He appears from time to time and by him the universe is held together. This is the

Manes of the Manichæans and the Mooni of the Boodhist, and of their common origin there can be little doubt.

Another remarkable circumstance is, that in the Punjaub a Boodhist priest is called Gnástic; a name so peculiar and so underivable from any dialect of the country, that there is some ground for believing it to be identical with Gnostic.

One of the branches of the Manichæan heresy was that of the Aphites, whose Agatho Demon was the serpent: and the serpent was a type of the Saviour of the world—or according to some, *was* the Saviour.

Now according to tradition Sál Byne or Salivahana was son of a carpenter, and educated by a potter. His father, the carpenter, was chief of a serpent tribe, called Tukshaka, who could at pleasure appear as serpents or as men. Vikramaditiya, king of India, hearing that a child should be born of a virgin, who should conquer him, sent forth an army to destroy the child. The child Salivahana, breathing life into an army of clay images which the potter had made to amuse him, sent them forth and conquered Vikramaditiya. His army, however, entering the holy stream of the Narbudda on their return, dissolved in the water.

“This\* Salivahana appears in the Bûdhi Sutwa of Siam as the Devetat or great foe and persecutor of Boodha through his ten stages of existence. Salivahana under the title of Tukshaka was crucified by order of Boodha on an instrument resembling the cross. Others say that he was impaled alive upon a double cross and hurled into the infernal regions: but the picture representing this, exhibits blood upon the arms and legs as if from crucifixion.”

It is manifest that Salivahana† was in some manner connected

\* According to Col. Low.

† Salivahana signifies the cross-borne. Hindoos however derive it from Shali, a winged-horse that could fly over the ocean, and Wahun a Rider: Rider of the winged-horse.

The following is the succession of kings of the Chundra-bunsi line according to Sanscrit records

Rana, king of the Dukkun or South, Maun Singh, his son, who reigned from Benares to the Dukkun.



with the Christian faith. That faith spread very early into India. The apostle Thomas is believed to have preached at the court of Gondofares, king of Ariana, as well as to the Indians of the coast of the Peninsula. It is certain also that Christianity in its purest form early overspread Persia. And the Chaldæan church (of which a remnant yet survives in the Koord Mountains,\* and which from the purity of its doctrine was in all probability propagated in the first century of our era) has records of Bishops of Merve, Heraut, India, Tabaristan, Samarcund, Mawaralnahr, Kashgar, Toorkistan, Bulkh, Seistan and Pekin of China, and fourteen others who need not here be named.

It is therefore probable that Salivahana was a convert to the Christian doctrine, which seems to me more reasonable than to suppose him an imaginary personage, the personification in fact of the Christian faith in India. For the Hindoos of the Indian Peninsula take their era from his reign, and the traditions of the Punjaub are full of his doings and of those of his son Russaloo.

Again to quote the researches of Col. Low. The Aryya Raja is the same as Deva Twashta or Devetat, (i. e. Sala Vahana) who was crucified by order of Boodha, whilst Boodha's disciples are styled Arahan.

Now as Boodha was contemporary with Salivahana according to the Siamese books : either those books are false or Boodhism arose in the first century of our era. As Christianity flowed down from the North-West into Persia, Ariana and India, so it is highly probable that with it would flow those peculiar doctrines of the Gnostics, which had distorted several sects of the church in Egypt, Syria and Persia. This may have been the foundation of Boodhism ; and the rival doctrines being preached to the same people at the same moment, would have become inveterately opposed the one to the other.

Salivahana or Sahl Bahn reigned from the Jelum to Cape Comorin ; Poorun, his son, did not reign.

Russaloo, son of Salivahana, reigned in the Punjaub, and with him closed the line, he dying childless.

\* See Layard's *Nineveh*, vol. 1st, chap. viii. This Church seems to have been protected so long as the reign of the Khaliphs lasted. The Toorks their successors persecuted and almost annihilated the Church.



Salivahana may have been called the Aryya Raja from his authority extending into Ariana or Arya, of which we must remember that the Punjab (the Western half of it at least) from time to time formed a portion. Salivahana seems to have been master as far as Jullalabad beyond the Khyber.

Of the birth of Russaloo and of his early history there remain many fabulous traditions. His father from fear of him kept him whilst young in a subterranean apartment. It therefore does not follow that the son was of the same faith as the father. Russaloo may have been either a Christian or a Hindoo. But it seems probable that his foes, styled Rakuss, were Boodhists, whom as the persecutors and murderers of his father, he would naturally have hated.

One of the most remarkable points in the religion of the Boodhists is their monastic establishments of both sexes. Another is their use of candles and cows in their religious ceremonies. A third is their practice of hoarding up relics. In all these respects they resemble the Roman and Greek churches, and it becomes a curious enquiry, whether they derived these remarkable institutions and customs from Christian sects, or whether the Christian sects copied from them; or whether both borrowed from the Essenes, who appear to have at least practised Monachism previous to the institution of Christianity. It seems to me not improbable that the Manichæans may be the original founders of Boodhism. That Manes may be the type of the Mooni of the Boodhist and of the Munnoo of the Hindoo.

The great difficulty attending such a theory is the inscription upon the rocks of Girnar and Dhauli. If the Asoka who engraved these was the grandson of Chundragupta and not a subsequent king of the same name, Boodhism must have preceded Christianity. It is however no uncommon thing to find the same name recurring in the lists of Hindoo kings. Thus in the Raja Tarangini we have two Domodaras, three Gonardas, two Vibhichamas, two Sunkramas, two Vikramadityas, two Naras: there is also an Asoka who could scarcely have been the great Boodhist king. Moreover although the lists of kings make Asoka grandson of Chundragupta, these lists are not very worthy of dependence. Wherever the number of kings does not agree with the period, they are supposed to cover

in history, pundits explain it by the omission of kings, sometimes for their supposed delinquency, at others from their reigns having passed with little incident.

Certain it is, that no traces of Boodhism met the Macedonians in the Punjaub in the sixth century before Christ. And Megasthenes who resided several years at the court of Sandracottos at Palibothra in search of all that was curious in the religion and customs of the Hindoos, seems to have been equally ignorant of the existence of Boodhism in the third century before Christ.

Antiochus the Great invaded India B. C. 103. Yet from that invasion flowed no knowledge of Boodhism into Greece or Syria, although according to Boodhist tradition the religion must have been instituted nearly 400 years. The earliest record we have of the existence of Boodhism in India appears to be that left by Fahian, the Chinese traveller, who in A. D. 412 represents all the Hindoo Princes, East of the deserts of India, as attached to the law of Boodha.

I have allowed myself to ramble from the immediate subject to which this is a preface, because the main use of all traditions is to throw light upon history; and this is done not only by the substance of the traditions themselves, but much more by the facts and suggestions we are led to, in endeavouring to elucidate them. It was thus in their search for the grand arcanum, that our fathers laid the foundation of the science of chemistry.

Of the original poem fragments only remain, and no Bard possesses more than a few of these. The Stanzas are sung to the accompaniment of the Citara, and the prose portions are rehearsed without music.

Specimens of the metre will be found at the end of the notes. It seems probable, that they are fragments of a complete traditional ballad.

(To the continued.)

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Notes on the Iron Ore of Korana in the Jetch Dooab of the Punjab, with a Qualitative Analysis of the same, by ANDREW FLEMING, M.D. EDIN. F. R. S. E. Assistant Surgeon, 4th Regt. Punjab Cavalry.

In the Report of the Proceedings of the Asiatic Society of Bengal for February as published in its Journal No. 2 of 1853, there appears a letter from Major Baker, dated September 20th, 1852, forwarding, to the address of H. Piddington, Esq. for analysis, a specimen of an iron ore from the Hill of Korana in the Jetch Dooab of the Punjab, which had been sent to him by Lieut.-Col. Napier, Civil Engineer, Punjab, along with a memorandum on its locality &c. by W. Purdon, Esq. dated 11th November, 1852.

Having been the original discoverer of this ore during a hurried trip made in January, 1852, to the Korana Hills, in company with Lieut. Grounds, Indian Navy, to whom I pointed it out, and having satisfied myself at the time that the ore was one of good quality, I was not a little surprised to observe the remarks made on it and the results of its analysis by Mr. Piddington.

These induced me to believe, that something very different from the Korana ore, had been sent by mistake, as the results of a qualitative analysis of the ore, which I have just made, amply prove.

Mr. Piddington, in his report of his analysis,* does not give the physical characters of the specimen examined, but remarks it has the appearance of a "rich carbonate of iron," than which nothing can be more dissimilar to the true Korana ore. The results of his analysis, appear to me to be such as would be obtained, from the examination of a ferruginous kunkur (calcareous tufa).

A specimen of the true Korana ore was forwarded by me to the Asiatic Society of Bengal marked No. 71, along with a collection of geological specimens from the Punjab, on the 26th October, 1852, and to it, I beg, those interested will refer.

The ore is of a dark brown, almost black colour, and with a satiny submetallic lustre. Its specific gravity is high and its streak reddish brown. Heated in a matrass it gives off water.

* See Asiatic Society's Journal, No. 2 of 1853, page 208.

In powder it does not effervesce with hydrochloric acid, but partially dissolves, the solution acquiring the characteristic brown-yellow colour of perchloride of iron.

A portion, finely powdered in an agate mortar, was digested in aqua regia, and evaporated to dryness. Water acidulated with aqua regia was then added, and the solution separated by filtration from a small insoluble residue of a dark-brown colour, apparently undecomposed ore (A).

To the filtered solution ammonia in slight excess was added, which caused a copious precipitate of peroxide of iron (B). This was separated by filtration, and the filtered liquid tested in the usual way for lime and magnesia, but without discovering a trace.* Hydrosulphate of ammonia did not indicate the presence of manganese.

The precipitate (B) was re-dissolved in an excess of aqua regia, the solution cooled as well as the weather would permit, treated with carbonate of soda and well stirred during effervescence.

The peroxide of iron precipitated was then separated by filtration and the clear solution boiled with a slight excess of carbonate of soda. No trace of manganese however could be detected.

The portion of ore (A) insoluble in acid was fused with carbonate of potash in a platinum crucible, and the resulting brownish slag treated with aqua regia. It dissolved entirely, with the exception of a few flakes of silica. The solution was then evaporated to dryness, redissolved in acidulated water, filtered to separate silica, and from the clear solution I precipitated the remaining peroxide of iron in the usual way, testing the solution filtered from it for lime and magnesia without detecting any.

From the above it is evident that the only constituents of the ore are—

Water.

† Peroxide of iron.

Silica.

* In the specimen analyzed by Mr. Piddington he found 65.14 per cent. of carbonate of lime (limestone).

† Not having any caustic potash nor material for preparing it available, I was unable to ascertain if any alumina occurred in the ore. From the appearance of the precipitated peroxide of iron, we should say it is absent or nearly so.

It is in short the limonite or brown hæmatite iron ore of mineralogists, on which Dana remarks as follows :

“ Limonite is one of the most important ores of iron. The pig iron from the purer varieties, obtained by smelting with charcoal, is readily convertible into steel.”

It generally contains from 1 to 10 per cent. of silica which in the Korana ore is not in large quantity.

At present the weather is so hot and I have so little convenience for performing analysis, that I am unable to make a quantitative determination of the constituents of the ore, which, I believe, will be found to yield about 80 per cent. (probably more) of peroxide of iron, a quantity equivalent to fifty-six of metal.

Having given a general account of the Korana Hills and of the mode of occurrence of the iron ore in my late report to Government on the mineral wealth, &c. of the Salt Range and its dependencies, I need not here enter into further detail. I may remark, however, that as I could only devote one day to the examination of the locality, I can give but little positive information as to the quantity of ore likely to be found. At one spot the mass or vein of it appeared to be of considerable extent. If it should be found to occur in large quantity in all the quartz veins throughout the different ridges forming the Korana Hills, the thick jungle in their immediate vicinity would afford abundance of charcoal with which to smelt the ore, and limestone as a flux could be brought from the Salt Range, if kunkur, which is no doubt to be found near at hand, would not answer.

We very much doubt however if iron could be manufactured in the Punjab, at a cheaper rate than English iron can be supplied.

It is not improbable that manganese ore (peroxide of manganese) in workable quantity may also be found at Korana, as on our visit there I also discovered and obtained unmistakeable specimens of this valuable mineral, one of which marked No. 72 was forwarded to the Asiatic Society in the collection above referred to.

Literary Intelligence.

(Communicated by DR. A. SPRENGER.)

Hájy Mohamammad Hosayn, the best publisher in India, has come from Lucnow to Calcutta with a view of establishing here a printing office (he is going to found new type) and a lithography for publishing Arabic and Persian works. The first books which he intends to publish is the Tafsyr of Nayshápúry and the Kyyn Akbary.

The following books have lately been printed :

تَحْفَةُ الاخيار ترجمة مشارق الانوار

Present to the good, being a Hindoostanee translation of the Masháriq alanwár by Khorram 'alyy in 1249. Beginning

الحمد لله ... حمد اور نعت کے بعد دریافت کیا چاہی

Lithographed Lucnow, Moçtafà press 1269, 2 vols. 8vo. 412 and 540 pp. with the Arabic text. This is the second edition.

کتاب فی اصول الفقہ المسمی الحسامی

Critic of the sources from which Laws are derived and on the manner in which they are derived by Hosám aldyn (this one of the texts on the subject read in schools).

Beginning

اما بعد حمد الله على نواله والصلوة على رسوله محمد واله فان اصول الشريعة ثلاثة

Lithographed, Delhi, very clear and with copious glosses, 1268, large 8vo. 184 pp.

معالم التنزيل تأليف الحافظ محي السنة ابو محمد الحسين بن مسعود البغوي

A commentary on the Qorán by Baghawý, the author of the Maçábyh. Beginning

قال الشيخ ... الحمد لله ذي العظمة والكبريا والغرة والبقاء

Lithographed, Bombay (there is a blunder in the very title-page) 1269 large 4to. about 800 pages.

سلك مسلسل

Anecdotes, witty sayings, riddles composed in Urdu, in 1266, by Chanká Prashád, whose takhalluṣ is Jonún. Beginning

بعد حمد وافر و نعت متکاثر کی بندہ کم استعداد

Lithographed, Delhi, 8vo. 1268, 30 pp.

مقامات حمیدی

The celebrated Persian imitation of the Maqámát of Haryry, by the Qádhiy Hamyd Abu Bakr. Beginning

الحمد لله الذي شرفنا فالعلم الراسخ

Lithographed, Delhi 1268, large 8vo. with glosses 132 pp.

دیوان حافظ

The Dywán of Háfiz with a few glosses.

Lithographed, Delhi, 1269, 8vo. of 338 pp. I have not ascertained what text it is. Hájj Moḥammad Hosayn tells me that he is bringing out a carefully revised text with copious glosses founded upon four commentaries. This will be a most important publication.

جواهر القرآن

Lectures and prayers for every day in the week, consisting of passages selected from the Qorán by Imám 'alyy a son of Sayyid Najaf 'alyy of Agra. Beginning

دل میں تھا یہی کہ سب سے اول مضمون

Lithographed, Lucnow, Moṭṭafà press, 1268, small 8vo. 145 pp.

We learn from a letter of Professor Fleischer that the Saxon Government has purchased at Damascus a collection of Arabic MSS. for 70,000 Piasters. It contains about five hundred volumes on various sciences, and is to be deposited in the library of the university of Leifzig. Most of the books are written in a clear and legible hand, and some of them are of great age. The oldest bears the date of A. H. 380, and there are several MSS. among them of the fifth century. It contains a great number of historical works and of Journals. Professor Fleischer is preparing a catalogue of this valuable collection.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,

FOR JANUARY, 1854.

At the Anniversary General Meeting of the Asiatic Society, held on the 4th inst. at the usual hour,

Sir JAMES COLVILE, Kt., President in the Chair,

The Secretary read the following report :

REPORT.

In presenting their annual report of Proceedings the Council have again occasion to congratulate the meeting on the actual condition of the Society, which, both financially and in respect of accession of members, is very favourable.

At the close of 1852 the Society numbered 139 members. Since that time it has lost three members by death and six by retirement, besides two whose names have been removed from the list under bye-law 13, for non-payment of subscription. There has however been an accession of eighteen new members, making the total number now on the Society's list 146, of whom 23 are absent from India.

Among the names of deceased members are those of the Hon'ble James Thomason and Major Markham Kittoe, both of them distinguished for the deep interest which they took in the prosperity and usefulness of this institution, and the latter a contributor to its Journal. The name of the other deceased member is Dr. F. Corbyn.

FINANCE.

The abstract Statement No. 1 annexed to this report, shews the receipts of 1853 to have been Rs. 19,933-13-7 which added to the sum of Rs. 3,762-6-10, the balance in the Society's favour at the

end of 1852 make a total income of Rs. 23,696-4-5. The total expenditure for the year has been Rs. 18,463-7-6, leaving a balance in favour of the Society, of Rs. 5,232-12-11. The gradual improvement of the different branches of the Society's resources will be best seen in the following statement.

<i>Receipts in 1852, in 1853. Disbursement, 1853.</i>											
Contribution,	Rs. 6,764	12	0	7,778	9	3	16	0	0		
Library including Socie- ty's Oriental and other publications,	1,652	11	0	2,176	9	6	1,624	13	9		
Journal,	1,074	4	0	816	4	0	3,496	5	0		
Museum including Govt. Grants,	7,368	1	0	7,368	0	0	7,955	4	0		
Building,	0	0	0	0	0	0	1,433	11	6		
Secretary's Office.....	2	11	0	0	0	0	1,906	1	0		
Deposits,	130	0	0	315	0	0	32	0	0		
Miscellaneous,	34	5	6	0	0	0	302	0	3		
<hr/>											
Total,	17,026	2	6	18,455	2	9	16,766	3	6		

The finance Committee have carefully examined the statement of outstanding assets, and at their suggestion, the council have removed from the account books, all such items as are not likely to be realized. The items thus removed amount to Rs. 4,186-5-11 and there are still a few which are doubtful of realization. The rest Rs. 8,210-3-5 however are certain of realization in course of this year.

The whole of the *liabilities* pressing or otherwise, including the estimated cost of the last three Nos. of the Journal not yet paid for, amount to 1,945-6-10, which deducted from the cash balance now in hand will, together with Rs. 884-14 in the hands of the London agents, leave at credit a clear disposable balance of Rs. 3,287-6-1.

This result will doubtless, the Council think, be acknowledged as satisfactory, especially when it is remembered that it has been arrived at after incurring heavy expenses for repairing and adding to
 A Rs. 1,171-3-6. the buildings (A) and for illustrating the contribu-
 B Rs. 1,506-4-0. tions (B) published in the journal.

The following may be taken as a fair estimate of the probable income and expenditure of the current year.

INCOME.

Contributions from 123 Resident Members,	Rs. 7,872
Government Grants,	7,368
Journal,.....	1,000
Sale of Society's Publications,	2,200
Do. in England,	200
Total,	<hr/> 18,640 <hr/>

EXPENDITURE.

General Establishment, Secretary's Office,	Rs. 1,470
Museum Establishment and contingencies,	7,920
Journal, say 7 Nos.,	1,800
Library including Rs. 1,000 for books,	2,250
Miscellaneous, including Building,.....	1,200
Total,.....	<hr/> 14,640 <hr/>

LIBRARY.

Since the last annual Report, the Library has received an addition of 153 volumes, many of which are donations from authors and learned Societies. Successive grants, amounting altogether to Rs. 1,000, have been made to the Library Committee for the purchase of additional works. Glazed cases have been provided for the Persian, Arabic and Urdu MSS. and others are in course of preparation for the Sanscrit MSS. The Council recommend that the attention of their successors may be drawn to the propriety of still further strengthening the resources of this Department in the course of the current year.

The new Catalogue in a more useful form than that published in 1843, is in the press and, it is hoped, will be published soon.

MUSEUM.

This Department has been enriched by the acquisition of several valuable ancient coins and sculpture.

OFFICERS.

The Council have again to express their entire satisfaction with the manner in which the Librarian and the Curators of the two Departments of the Museum have discharged their duties.

JOURNAL.

Seven numbers of the Journal have been published during the year just closed. They contain a great variety of papers, many of which were placed at the Secretary's disposal by order of the Most Noble the Governor General of India, to whom the acknowledgments of the Society are due.

ORIENTAL GRANT.

Marked progress has attended the change made in the mode of publishing the *Bibliotheca Indica*; no less than twenty-two Nos. have been issued during the year under review. Of these 9 are Arabic and the rest Sanscrit, and they include portions of the following works.

1. The *Uttara Naishada Charita* by Sri Harsa, with the commentary of Náráyana, edited by Dr. Röer, Fasciculi V. VI. & VII. Nos. 46, 52, and 67.

2. *Chaitanya Chandrodaya*, or the incarnation of Chaitanya, a Drama in ten acts, by Kavikarnapura, with a commentary explanatory of Prakrita passages, edited by Bábu Rájendralál Mittra, Fasciculi I. II. Nos. 47, and 48.

3. *Suyuty's Itqán* or the exegetic sciences of the Korân. Edited by Moulavees Bashurooddin and Nurool Haqq, with an analysis by Dr. Sprenger, Fasciculi II. III. Nos. 49, and 57.

4. *Taittiriya, Aittaréya, Swétas'watara, Kéna, Isa, Katha, Prasna, Mundaka, and Maṇḍukya Upanishads*, translated by Dr. Röer, Fasciculus II. No. 50.

5. *Sáhitya Darpaṇa* or Mirror of Composition, a Treatise on Literary Criticism, by Viswanátha Kavirája, edited by Dr. Röer and translated into English by Dr. J. Ballantyne, Fasciculi III. IV. V. Nos. 53, 54, and 55.

6. *Lalita-Vistara*, or Memoirs of the life and Doctrines of Sákya Siṅha, edited by Bábu Rájendralál Mittra, Fasciculus I. No. 51.

7. *Fotooh Al Sham*, being an account of the Moslim Conquests in Syria, by Aboo Ismaail Mohummed 'bin Abd Allah al'azdid al Ba'ri. Edited by Ensign W. N. Lees, Fasciculi I. II. Nos. 56 and 62.

8. *The Conquest of Syria*, commonly ascribed to Aboo Abd Allah Mohammad B. Omar al Waqidi, edited with Notes by Ensign W. N. Lees, Fasciculi I. II. Nos. 59 and 66.

9. *A Dictionary of the Technical Terms used in the sciences of the*

Musalmáns, edited by Moulavees Mohammad Wajyh, Abd Al Haqq and Gholam Kader and Dr. Sprenger, Fasciculi I. II. Nos. 58 and 65.

10. Biographical Dictionary of Persons who knew Mohummed, by Ibn Hajar, edited in Arabic by Moulavees Mohummed Wajyh, Abdul Haqq and Gholam Kader and Dr. Sprenger, Fasciculus I. No. 61.

11. Tusy's List of Shy'ah Books and 'Alam alHoda's Notes on Shy'ah Biography, edited by Dr Sprenger, Fasciculus I. No. 60.

12. Sarvadersana Sañgraha; or an Epitome of the different systems of Indian Philosophy, edited by Pandit Iswarachandra Vidyásagara, No. 63.

Among the works in progress, the Council would especially draw attention to an edition of the Black Yajur Veda, the only portion of the ancient Hindu scriptures which for want of MSS. no scholar in Europe has yet been able to undertake. It will complete the series now in the course of publication under the auspices of the Hon'ble Court of Directors by Messrs. Müller, Weber, Benfey and Roth. The Sanhitá portion is to be edited by Dr. Röer and the Brámanah by the Society's Librarian, Bábu Rájendralál Mittra.

Resolved on the proposition of the President, seconded by Mr. Houstoun, that the Report be received and adopted.

In compliance with the notice given at the December Meeting, the President also proposed that section 6 of the Bye Laws be modified by omitting the words "is anxious to promote the cause of science and Literature and." Hon'ble Col. J. Low having seconded the resolution, it was carried unanimously.

The meeting then proceeded to the election of office-bearers for the current year, and appointed Mr. Houstoun and Dr. Macrae Scrutineers, who announced the following to be the result of the Ballot.

PRESIDENT.

Hon'ble Sir J. W. Colvile, Kt.

VICE-PRESIDENTS.

Hon'ble Col. J. Low.

Sir H. M. Elliot.

Bábu Ramgopaul Ghose.

COUNCIL.

C. Allen, Esq.
Dr. G. G. Spilsbury.
Dr. Macrae.
Major Baker.
Captain Thuillier.
Rev. W. Kay.
Dr. Röer.
H. Woodrow, Esq.
H. Walker, Esq.

SECRETARIES.

Dr. A. Sprenger.
A. Grote, Esq.

SKETCH
BY CAPT. J.C. HAUGHTON
 Princ'l Ass't Commr
 TO ILLUSTRATE A MEMORANDUM ON THE
GEOLOGICAL STRUCTURE AND MINERAL
Resources of the
SINGBHOOM DIVISION
S.W. FRONTIER

References.

Granite	Dark Rocks
Metamorphic Rocks	Most frequent & best
Siltstone	Most frequent & best
Marl & d.	Most frequent & best
Gold Sands	Most frequent & best

The map shows the Singbhum Division, S.W. Frontier, with various rivers and towns. Key features include the Kanchi River, the Sanku River, and the Sanku River. Towns such as Tynaria, Bando, and Kanchi are marked. The map also shows the Sanku River, the Sanku River, and the Sanku River. The map is a detailed geological sketch by Capt. J.C. Haughton, illustrating the geological structure and mineral resources of the Singbhum Division, S.W. Frontier.

17 BY H. M. SMITH & THE SURV. GEN'S OFFICE CALCUTTA, JANUARY 1854.

Scale 6 miles = 1 inch.

Reduced from the Original in the Rev. Surg. Gen's Office, Calcutta, January 1854

JOURNAL

OF THE

ASIATIC SOCIETY.

No. II.—1854.

Memorandum on the Geological structure and Mineral resources of the Singhbhoom Division, South-West Frontier Agency. By Capt. J. C. HAUGHTON, late Assistant to the Governor-General's Agent in the South-West Frontier.

In order to clearly understand the Geology of the country to which this memorandum refers, it appears desirable to allude also to the principal geographical features connected with it, as they present themselves.

To the North West lies the table of Chota Nagpore, the general level of which is between 1,200 and 2,000 feet above that of the sea. The base of this table-land appears to be gneiss, passing in some places into granite. It is usually covered by quartz, gravel, and ferruginous clay. The gravel has the appearance of being formed on the spot from the disintegration of quartz, its chief component, and except in the beds of streams, is not rolled.

The gneiss in many places, rises into domes and conical hills of no great elevation. These are occasionally giant masses of solid rock, which must have been protruded in a semi-liquid state. In other instances they consist in huge fragments promiscuously heaped together, as though the upheaval of the rock were accomplished by sudden violence, applied after it had become consolidated. The quartz is often found almost alone, and frequently contains large crystals of schorl.

The tableland of Chota Nagpore gives rise to the Damooda flowing South East into the Hooghly and the Sooburno Rekha and

Bamunee, flowing more Southerly into the Bay of Bengal, the sources of which rivers or their tributaries, are all within a short distance of the station of Chota Nagpore. The table-land extends in a North East direction from Ruttunpore* of (great) Nagpore through Juspore, the North West extreme of Singhbhoom, Tamar and Pachete to the Trunk Road East of Purusnath, the Southern termination of it is generally rather abrupt from Ruttunpore to the neighbourhood of Singhbhoom, where lofty ridges stretch South from it. Again it resumes its character in Tamar, where it is marked by the rivers Kanchee and Kurkuree, tributaries of the Sooburno Rekha. Further East the terminations appear to be more gradual. The Southern slope is generally covered with jungle, consisting of sal and other trees common to Bengal, intermixed with bamboo of a description which does not attain any great size.

South East of the table-land above described, schists, slates, old sandstones and others, which may all be called metamorphic rocks, are met. The appearance of these rocks varies greatly according to their proximity to the igneous rocks which underlie, overlie, or pierce them. Below the table-land, gneiss ceases to be the principal rock, but still occasionally shows itself. It is seen as far East as the neighbourhood of Bancoora, and South to the frontier of Mohrbunj in the tributary mehals, possibly further. The quartz gravel still abounds, and is in many places so rich in iron as to be smelted. In other places the quartz appears to be entirely replaced by oxide of iron and nodular or magnetic iron ores.

In this region the metamorphic rocks are every where pierced with dikes of green stone trap and allied rocks, most of which are extremely rich in iron. This fact I learnt to my sorrow from numerous triangulations made with a view to the compilation of a map during my tours in the district, having been rendered useless by the effect of local attraction on the magnetic needle, which I had not leisure to investigate. The greenstones disintegrate into a rich ferruginous earth, containing a black iron sand which is attracted by the magnet. The greenstone hills are generally long dikes running in a Northerly and Southerly direction, and are chiefly of little altitude; but in some places they attain a considerable elevation.

* 1,539 feet above the sea.

The Baghmoondie trigonometrical station which is on one of these hills, is, by the boiling point of water, about 1200 feet above the sea. The rock of this hill shows a disposition to columnar form. I was much puzzled to account for the sharp angular appearance, which the blocks forming the surface of these hills exhibit; the more, as in many instances the fracture was recent. Careful observation showed that these very hard masses had split of themselves, by the unequal contraction of their parts when, after being heated by the sun, they were suddenly cooled by heavy rain.

The metamorphic formation appears to extend South to Sumbulpore and Goomsoor, having basins in it containing secondary strata and coal formations. One of these appears to occupy the territory of Deknal in the tributary mehals, and another to extend from Gangpore South Westerly through the North of Sumbulpore towards Ruttunpore. The existence of coal in the valley of the Hutsoo (Husdah) has long been known. I have found it also in the bed of the Mand at Chunderpore; both these streams are tributaries of the Mohanuddy. The Gangpore coal formation is probably connected with that of Sirgooja and Palamow; but on this point I have no reliable data. To return however to a more particular account of the country which I am desirous to describe. I may observe that hills of metamorphic rocks of various elevations, seldom beyond 1200 feet, run Southerly from the table-land of Chota Nagpore, dividing Singhbhoom from Gangpore and Bunnye, another spur of the same range runs Easterly dividing Tamar and Patcoom from Singhbhoom. This range slopes down gradually to the Sooburno Rekha. There are some corresponding ridges east of that river, but these are intersected by Dulma, the rival of Purusnath, which lies Southerly from Pooroolea and stretches still further South, sending off spurs in various directions. This hill exteriorly at least, appears to be composed of metamorphic rocks. It attains a height of 3,049 feet. Smoke is said to issue from a fissure at the top, but the information I possess on this point is very vague. South of Dulma are hills of the same class of rocks of inferior height; these however abound in mineral wealth; some assume an Easterly and Westerly direction for instance, the range of Bellipharee and the Dhoba range; others, as the Ranga Mittee range, run North and South.

The latter attains considerable height, and divides the estate of Dhulbhoom in half, joining the high hills of Mohrbunj to the South.

In the South of the Colehan, a table-land rises rather abruptly to the height of about 1000 feet above the level of the sea. This table declines gradually to the West, South and South East. In the latter quarter it joins the base of the high mountain Badam in Mohrbunj. This table is composed of gneiss, greenstone and metamorphic rocks. It is for the greater part cultivated, and was formerly the site of many populous Hindu villages, from which the inhabitants were expelled by the Coles.

The river Byturnee collects the drainage of this table to the South West and the Khurkhy to the East and South East; the former flowing South East into the Bay of Bengal and the latter North Easterly into the Soburno Rekha. The Baminee (not the Byturnee, as shown in most maps) receives the waters of the Western portion of the district as the Suburno Rekha does, the whole of those of the Eastern portion.

Eastward, in Dholbhoom beyond the Sooburno Rekha, hills gradually disappear; the surface of the country exhibiting undulations which imperceptably merge into the plains of Midnapore. The soil in the more elevated portions of these undulations, consists of Laterite abounding in iron. A variety is extensively smelted for that metal.

To the north-east the hills cease more gradually and extend further to the eastward, but they appear to be succeeded by the same laterite soil as to the south.

It will be seen from what has been said, that the Singhbhoom division is a very hilly country consisting geologically of rocks either of igneous origin or of slates, schists and old sand stones more or less altered by the action of heat.

In such formations minerals are commonly found, and this district forms no exception to the general rule. The metals known to exist are gold, copper, bismuth, and iron; the existence of tin is believed, but the ores require further examination.

To the above list may be added the other mineral products useful to man. These are, as far as yet known, potstones, ochreous earths, and corundums. I propose to detail the localities in which each

mineral is found, adding such information regarding their production as appears likely to be serviceable.

Gold.

This metal is found in almost every river and stream in the country. The apparent exceptions are those which flow almost entirely over igneous rocks. I cannot learn that the metal is found any where in the Khurkhy, and an attempt to extract it from the sands of that river made under my direction failed. The sands of the Roro and its other tributaries were not known to contain it; but on examination a small quantity was extracted from the sands of the Roro and Eleegara by people deputed for the purpose.

I believe gold is found in most parts of the Sooburno Rekha, from the point where it quits the gneiss formation, till it falls into the Bay of Bengal. I know certainly that it is found so low as Kamerara, on the boundary of Dholbhoom and Mohrbunje.*

Gold is found on the surface of the soil at Arabhanga and other places among the wild jungles of Sarunda; in Anundpore, at Badea in Dholbhoom close to the old copper diggings, and probably in other places. There is a tradition of a mine in the jungles of Porahat, from whence large quantities are said to have been formerly extracted. This mine is stated to have been driven horizontally from the bed of a nulla into a hill, it is now said to be completely choked with rubbish. I have seen specimens of the gold from the stream close by, which would lead to the belief that the original source was not far off, the gold being often in short wiry threads, or in little rings. All I had from this source I made over to Mr. Robinson when in this quarter, more is not procurable in the rains.†

* An account of the process of gold-washing at Heera Khund on the Muhanuddee is given by the late Major Ouseley. Journ. Vol. 8, p. 1057—Eds.

† Mr. Robinson's own account of his operations in this country is given in a letter of his dated Rauchee, 20th December, 1849. The following are extracts from it.

“ I now want to call your attention to another subject. *Gold Mines*—real genuine gold mines. I enclose you the copies of the Official Papers about them, and proceed to add my testimony on the subject, as also some aspirations. When I came up here last year, I went on with M—to see the mines, visiting every place where they existed, and a most extraordinary sight it was—they are real mines with shafts sunk down to them varying from twenty to sixty feet in depth,

Gold is found in situ near a slight eminence a little north Assuntullea in Khursowa, to the west of the road. It cannot however be very plentiful, as few take the trouble to look for it. This spot is well worthy of a careful examination, as being the highest in the

all very close together because the people are afraid to run galleries under ground, in some places the old shafts are so numerous that I can only compare the country to a gigantic rabbit warren, and they must have been sunk nearly 100 years ago notwithstanding which the soil in which the gold is found is as abundant as ever; in some places where the ground is cut by rivers and nullahs, it outcrops in the banks, but these are not numerous, the shafts being the chief resource. The gold is found in several sorts of soil, a blue clay; a red clay of a very singular description, and a yellow clay full of large gravel or stones. The gold is separated from the soil by washing in wooden troughs, the principle being exactly the same as that of the *cradle* used in California, only without the slight aid of machinery applied to that plan. Another plan and a very remarkable one, in which the people collect the gold, is by drawing up small water-courses before the rains, so as to make places for a deposit of soil carried down by the water: this soil is cleared out several times, and in it is found a large deposit of gold, proving that it exists all over this particular tract of country in large quantities. I believe that the formation of gold is still very little understood, and from my observation am convinced that it takes place only in small particles, and in particular combinations of soil; by the action of water these particles may become collected in larger or smaller quantities in certain places, but I believe generally the gold is found where it was formed: these mines at such a depth as 60 ft. underneath jungle, and over such a large extent of country, render any other supposition very improbable. It is impossible to arrive at any estimate of the total annual produce of all these mines, because the gold is carried away by native mahajuns who exchange rice, salt, &c. for it, in such an infinity of directions, and the people themselves are far too primitive and ignorant to be able to give any idea upon this point. That it must be large however is certain, from the comfortable appearance of the people, and from the abundance of gold possessed by all the Rajahs, Zeminders, and other wealthy men all over the country; the regular price at which the people who work in the mines will sell the gold is Rs. 10 per tolah (R. 1 weight) but they much prefer exchanging it for rice, salt, ghee, cloth, &c.

My journey extended as far as Robhobe in Oodipore 220 miles hence, and finding that place was best adapted to an experiment on a small scale, water being abundant from the river Soane, I left M. there and returned here, when I got a lease of the village with liberty to work the mines from Government for seven years. The result of this trial I found to be, that basing it on a simple calculation of labour, a man to whom I paid 1 anna per day, produced me between 3 and 4 annas worth of gold, and of course this return could be increased materially, by

immediate neighbourhood, the metal must be derived from the rocks which there are just obtruded from the soil.

It is very difficult to estimate at what rate the metal might be produced, as it is seldom searched for, except to order. The Ghassees, the employment of some simple machinery for increasing the quantity of earth that a given number of men could wash in a day, and by the economy of labour arising from a well organised system of employing the men. My gold I sent down to Calcutta where it was assayed at the mint, and proved of the value of Rs. 14½ per tolah a price at which I afterwards sold it in the bazar. Robkobe however being in the very heart of the jungles, and very low, proved so intensely hot and unhealthy that M. was obliged to come in here sick, and I had to give up the works, for I am sure no European could live there. Even this country is as little known as any in India, but 150 miles of my journey, was where *a European had never been seen before and a white face was a wonder to the people*, you need not therefore wonder that the riches of the country are at present totally unknown except to very few. Mr. Williams the Geologist was on his way to visit it when he was taken ill and died at Hazarebagh 40 miles hence. Now I want you to consider the following. The *best mines* are in Jusspore about 100 miles hence, 4 days march, where the country and climate are very fine indeed, and I am quite sure that a very fine thing could be made of working them if a capital of Rs. 40,000 and Rs. 50,000 could be raised for the purpose. The late Rajah Ram Singh worked them for a short time, and it is known well that their produce was very large. Unfortunately however from some ill construction, one of the shafts fell in, killing a number of people, and he was obliged to give them up for a time: his death occurred shortly afterwards, and his son Pertab Narain Singh the present Rajah, is one of those individuals, who considers doing any thing for profit a degradation, and beneath his dignity. I applied to him through Colonel Ouseley for pottahs of the mines, but he replied by saying that they were let up to the end of the present settlement and he could not give them; he is very averse to Europeans doing any thing in his country, and did his best to thwart my plans in many underhand ways: however the settlement expires next year, and it is then the intention of Government to reserve the minerals to themselves. I have had some correspondence with them on the subject, and they have now referred me to Mr. Crawford the new Agent, Colonel Ouseley's successor. He however has not had time yet to enter into the subject with me, but will do so in February when he returns here from his tour in the district, and I have no doubt I shall be able to get a lease of the mines for a good term of years. *Gold mines* is a very large word, but there is in this case no nonsense about it: I have seen the thing myself, and without stating any Californian ideas, know that these mines must pay splendidly to whoever gets them."

Robkobe is situated on the river Mand an affluent of the Muhanuddee, and is believed to be on the site of Oodeypore of Tassin's Map. 'The largest mine,'

the lowest class in the country, who wash for it, always demand an advance before they will set to work, and at the same time steadily refuse to work by the day, insisting on selling it at a fixed rate to their employer. They can always reckon on earning from three to

says Col. Ouseley in a report to Government in 1847, 'is a quarter of a coss E. of the village. The three houses of gold diggers can only collect one or two ruttees a day.'

'There are six other places where gold is found. In mouzah Kumhar on the Koorja river, in Kauraja, Salga and Byraggy on the sides of the Sungool river at Bakarrama on the banks of the Bhurrary river in Baghbehal at Jumergy in one of its Tolas called Pilma or Pimla on the banks of the Mynee river, but at all these places the quality of the gold is inferior (or white gold "Chakha Sona") to that of Robkobe, and there are no gold finders in any of these villages.'

'There is no foreign traffic in gold, the villages exchange rice, &c. with the gold finders of Robkobe, and only in very small quantities, it is sold at one rupee the Masha, or at the rate of ten or twelve rupees a Gold Mohur. It would be desirable to send a person who understands these things, to the place after the rains, from Calcutta, one who is able to judge of the quantity that might by scientific means be realized, (this is not like mere sand washing, it is a "Khan" or mine, and may prove to be invaluable:).'

'In a letter dated a month later Col. Ouseley calls attention to the surprising difference between a third supply of Robkobe gold dust which he was then sending to Government, and the dust generally washed from the sands of a river.

'The latter description consists invariably of minute lamina, as if in its passage among the rocks, stones and gravels of the river, it had been hammered into thin scales, this dug from the matrix, it is observable—is in granules of various forms—it is also of a richer hue.'

Subsequently Col. Ouseley sent eleven rupees weight of gold from Phursabehal in Juspore a fief of the Srigooja State, and about fifty miles from Robkobe. Here also the gold is dug for, not washed—each village is bound to pay a certain weight of gold annually to the Rajah, the Thekadars buying from the diggers and paying them for it in rice. Villagers from the adjacent States also buy gold here.

Mr. Dodd's assay report on the first supply from Robkobe was as follows, showing the gold dust to be exactly of standard quality.

Gold.	Silver.	Alloy.	Total.
91,667	3,646	4,687	100,000

A second report dated August 1847, is after assaying some melted lumps as well as dust.

Table exhibiting the results of assays on the 3d supply of gold dust, and the 2nd of lumps forwarded by Lieut.-Col. Ouseley, Governor General's Agent S. W. Fr. from the mines of Robkobe and Phursabehal.

four pice per day, and I am assured that a vigorous man often gets as much as twelve annas, which, as the ordinary rate of field labourers' hire is about one pice, must be considered a very large sum.

The metal was found some years ago in considerable lumps in the Sona Nuddee of Sonapet in Tamar, on the northern extremity of Singhbhoom; and much is still found there; but the lucky man who got the "Nuggets" is believed to have kept his secret to himself.

Quantity re- ceived.			Pure Contents.			Assay.	Intrinsic produce in Tolas, or new standard of Gold Mohur.
			Base al- loys.	Silver.	Gold.		
1	2	6	4,047	8,062	87,891	3 $\frac{5}{8}$ Ws.	95,888
0	8	0	....	7,031	92,969	1 $\frac{1}{4}$ Bt.	101,420
10	14	0	....	12,079	88,021	3 $\frac{1}{2}$ Ws.	96,023

And a third report dated November of the same year gives the following results.

Certificate of the outturn of gold lumps and dust received from Lieut.-Col. J. R. Ouseley, Governor General's Agent, S. W. Frontier, through C. Beadon and A. R. Young, Esqs. Under Secretaries to the Government of Bengal, as per their letters dated the 31st March, 23rd June, 4th and 11th August, 1847, on account of the East India Company.

Mint Regr. No.	Description.	Tale.	Weight in Tolabs.			Assay.	Assay produce in Gold Mohurs.		
1847. 27th Aug. 545	A gold Ingot from gold lumps and dust, .....	..	12	0	3	1 $\frac{7}{8}$ Br.	12	4	4
			12	0	3				
						Gold Mohurs.	12	4	4 or
						Co.'s Rs	184	1	0

(Signed) PEAREE MOHUN SEN,
Bullions Keeper.

(Signed) W. N. FORBES,
Mint Master.

The gold of Sonapet is considered the best. The price varies from ten to seventeen Rs. per tola. I think it probable that a much greater amount might be extracted, and great labour saved by treating the residuary sand, found after the coarse gravel is got rid of with mercury ; I have collected some of the sand that this question may be decided ; also with a view to examination, for other metals which elsewhere are found, to accompany gold.

The process of washing has often been described. A wooden tray like those used by butchers in England and an iron hook to loosen the gravel with are the only implements. The labourer may be seen after his day-work melting the result, with a bamboo tube for a blowpipe, and a little bit of borax as a flux, at a common wood-fire, where several work together they weigh it on the spot and decide the share of each. In Tamar during the dry season numerous parties assemble and dig great pits in the bed of the Kurkuree river, but any thing approaching to a mine, I have not seen.

The spots where gold is found most abundantly are those where the strongest currents of the streams are met by a bank of the river ; thus, search would be made at A in the annexed diagram in preference to any other points.

My own belief is, that the precious metal is derived chiefly from the metamorphic rocks, i. e. slates and schists which have been altered by the action of fire. The natives do not appear to have any suspicion as to its source, and I have not heard of any instance in which the metal has been found attached to stone.

Quartz and large quartz dikes abound. I have searched the soil without success in the neighbourhood of some of the largest dikes. The stone itself has yet to be examined.

Copper.

There were vague rumours of the existence of ancient diggings for this metal when I first entered Singhbhoom, but on those spots where it had formerly been found, it had long ceased to be sought for. There was no local tradition as to when, or by whom the diggings had been worked, and it was a matter of doubt whether they were really made for copper. In Seraikela the Zemindar assured me that the metal had not been sought for during the time his family had been settled there, that is for about a century.

In 1847, I ascertained beyond a doubt that the metal existed. A small quantity of the ore was rudely smelted. This gave a little metallic copper. Since then the Zemindar of Dholbhoom and Seraikela have turned their attention to the matter, and some forty or fifty maunds of the metal are now extracted annually during the dry season.

The localities of the veins known to me are Booreetopa in Khursowa, Narainpore and Jamjora, in Seraikela, Landoo, and in fact the whole circuit of the Dhoba hill, Rangamuttee hill, a spot on the south side of the Kapergadee Ghat, Badea, Oraon Ghur, and a spot near Kamerara, all in Dholbhoom.

The vein in Khursowa lies east and west. It is situated about three miles south of the town and a little northwest of the Moza Booree Topa. The vein has been laid open at intervals for about half a mile, but the diggings are nowhere more than about ten feet in depth. The matrix appears to be schists and quartz. The most promising specimens of the rocks picked up on the spot gave 25 per cent. of metal, but it was so largely contaminated with iron, as to be attracted by the magnet. I think it probable that the vein is now quite as well worth working as it ever was; the operations have been entirely superficial, and it is manifest that a large portion of the vein remains absolutely untouched.

Copper was formerly mined in a hill still called Tamba Doongree,* near Narainpore in Seraikela. The old shafts are very small and irregular. The largest was sixty feet deep. All appear to have been designed to be perpendicular. A very superficial inspection showed that the miners had worked completely at random. The hill consists of schists, in contact with trap; the strike of the strata is No. 86° east, and its dip about 45° north-east, but no regard appeared to have been paid to either. The only rock on which I saw any trace of copper was a trap, or possibly a very much altered schist. No attempt that I am aware of has been made to re-work this vein. The workings, as far as I could ascertain, were entirely vertical, so that the vein must have been quickly passed through, and in such case, would be as good a speculation as ever. The old shafts are about twelve in number.

* Copper Hill.

The Jamjora digging I have not seen. It is said to be entirely new. It is manifestly a continuation of the Dhoba hill vein, or more correctly speaking, part of the same system of veins. The ore is a very promising one. It is very friable, consisting it would seem of a decomposed schist. It contains but little sulphur, which enables the rude operators to smelt it directly, some specimens contain a good deal of bismuth and iron. Those examined by me gave an average of 22 per cent. of copper, sufficiently pure to be marketable.

I have been informed however that some specimens examined by Dr. O'Shaughnessy gave as much as 43 per cent. of metal.

An English gentleman endeavoured in 1852 to obtain a lease of the mines both in Seraikela and Dholbhoom. He was not successful. The Zemindars, on whom I had strongly urged the advantage of employing European skill and capital, objected to me that the "Sahib Logue" once admitted, soon become masters of their estates.

The copper vein at Landoo as I have already remarked, appears to belong to the same system as that at Jamjora, I have not examined the ore, which appears to be more compact than that just mentioned, and probably contains quite as much metal. The present working is I believe new; but I traced round the foot of Dhoba hill with which it is connected the scoria of old furnaces for some miles, all memory of the workers has perished.

About three miles east of Kalkapore in Dholbhoom is a hill called by the Hindoos Rangamittee, and by the Coles, Sontals and others Sengil Booroo; the Cole equivalent for "fire mountain." This hill which consists of altered schists, rises about eight hundred feet above the surrounding country, half way up are perpendicular cliffs of foliated schists which contain copper, and I have ascertained the presence of the metal in an ore of iron taken from the very top of the hill. No mine has been attempted here. Oxide of copper is scraped in small quantities from the surface of the rocks, where water finds its way from above, and is sold in trifling quantities by the natives. The only use to which it is applied, that I could hear of, is for blackening the teeth of the ladies.

At the base of the above cliffs is a fissure, the mouth of which is only just big enough to admit a man's head. It is regarded with

superstitious dread by the inhabitants of the neighbouring villages. When at Kalkapore last year, I through the influence of the Sirdar Ghatwal, collected a party to visit it. It was evident from the stories told, that a visit to it had been a rare event, nothing daunted I climbed the very steep hill at dawn, and with some little difficulty reached the place.

The cavity appeared to penetrate the hill horizontally. As we had no light, I could not ascertain whether it expanded internally or not, for my head closed the entrance. The natives who were with me, could not be induced even to approach it. They asserted that unearthly noises were occasionally heard proceeding from it, and that in some years *after very heavy rain*, fire issued from it. I could not detect the odour of any gas exhaling from it, and the cave itself had no appearance of igneous action about it. A bush was growing a few yards in front, which could not be the case, had a jet of burning gas issued from it within a period of two years. There was a white waxy exudation (which seemed to me to be nitrate of soda) in small quantities on the rocks.

The dung of porcupine and hill-rats showed that the cave was an abode of these animals. The Sirdar promised to send me notice on the next occasion of fire breaking forth, but though we have had some very heavy rain this year, as yet no notice has been given to me.

The mountain undoubtedly contains copper disseminated through a very considerable thickness—at the least some hundred feet of rock. Whether it contain a vein of sufficient richness to repay the labour of working, careful examination must decide.

The copper vein at Badea may be traced for about two miles in a north-westerly direction into the jungles. Its course is shown by a series of pits varying in depth from ten to forty feet. It has not been worked within any traditional period, and trees of large size grow on the edges of the pits. I have not seen any genuine specimen of copper ore from this locality, though fragments of quartz coloured with the oxide of that metal are abundant. A specimen was handed to me from the immediate neighbourhood as containing lead, which it was asserted had been extracted the year before, from the same ore, I failed however to find any trace of lead in it, but think,

that the results warrant me in saying it contains a little tin. My means were very imperfect, and the examination a very hasty one. I have no doubt that Mr. Piddington who has it under analysis, will be able to decide the question. The traces of copper found at the Rangamittee hill I have little doubt are a continuation of the same vein or series which exists at Badea, for the metal is again found at Ooraonghur about four koss north-westerly, and again at an intermediate point near the Kapergadee ghat. I have not visited these places, nor have I any particular description of them. They suffice to show that the metal is found in one right line for about fourteen miles.

The Badea workings would yield as much profit now, as they did originally, the outcrop of the vein having been alone worked and between each pit as much space as occupied by one pit is left apparently untouched. Time did not admit of my clearing the soil sufficiently to ascertain the dip, the strata were as well as I could judge, nearly vertical. The strike determined rudely by the direction of the pits is N. $27^{\circ} 14'$ easterly by compass.

Close to the digging, on the road where the soil has been broken down by carts, small quantities of gold are found amongst gravel consisting of quartz and schist.

Iron is also found near at hand. The ore of the latter is of a sort unique in this quarter.

Two and a half miles north-east of Kamerara are some more old copper diggings. These run in a northerly and southerly direction as those at Badea, for a couple of hundred yards. They are entirely the same in character, some specimens of the ore which were handed to me by Mr. Campbell gave $24\frac{3}{4}$ per cent. of copper. The ore is hard and vitreous, and contains much sulphur with some iron.

The richest veins of copper within the Singhbhoom division are apparently those of Landoo and Jamjora; but it is possible the old diggings, if carefully examined, might be found to contain equally good ore. The open workings are liable to be filled with water from the rain, but I think that shafts sunk into the soil would be found to require less drainage than usual. The freedom of the ores in general from sulphur and their softness renders them well worthy of the attention of speculators. Labour is cheap and abundant, and if that on the spot fail, Dhangurs may be had from Chota Nagpore, at

the rate of about Rs. 2 per man per mensem. The Bhoomij of Dholbhoom however often goes to the Mauritius classed as a Dhan-gur. Wood-fuel may be had in sufficient quantity to last eight or ten years near all the localities named. I am unable to say whether coal could be brought at the end of that time at a rate sufficiently low to admit of its use. The Raneegunj collieries are, I think, the only ones which could be thought of for the supply.

From the diggings at Kamerara* there is a good road only 85 miles in length to Tumlook. The distance from Landoo or Jamjora to the Cossye River at Dhee Kullianpore is about 70 miles, and that river might, it seems probable, be available for water-carriage during short periods in the rains, as the Damoodur is, at points far above those where it is ordinarily navigable. There is every facility for the construction of a good road to Dhee Kullianpore or to Midnapore, and in fact there was formerly a Government route in nearly the same direction; the old road from Gurbheta in Midnapore to Sumbulpore, which might possibly be still available for some distance, though it has been abandoned by Government these thirty years. The distance from Tumlook viâ Midnapore would be about 132 miles.

Iron.

This metal is found at almost every mile throughout the district. The localities in which a superior metal is produced are not however numerous. At Bitā Booroo, and Narain Bera in Khursawa, several localities in Serai Kela at Neeldee, and Huldee bunnee in Dholbhoom, and two or three places bordering on the Midnapore frontier within the latter estate, where the ore is worked for exportation to Behar, Burdwan and Midnapore. The best metal is from Narain Bera, where a nodular ore is worked; schists, and near Badea a rock seemingly of igneous origin, slightly magnetic, are smelted. The laterite is also used, I believe, towards Midnapore. The ore of Narain Bera is strongly attracted by the magnet. The ironsmiths move about, abandoning rich ores on the failure of a supply of wood, which alone limits the production of the metal.

POTSTONE.

Potstone, which would appear to me a variety of schist, is worked

* 45 miles west of Midnapore.

in very many places. It differs much in quality. Some specimens appear almost indential with French chalk ; the stone of Doobraj-pore in Seraikela is of this sort ; others approach English slate in texture, as the stone from Tickree in Dholbhoom ; some abound in iron pyrites as the Potstones of Korykela in Porahat and Eleegara in Singhbhoom. Occasionally the rock appears to contain much siliceous matter, as at Arrahanga on the N. Frontier of Khursawa. The Potstone I consider a particularly valuable product, as the mines are inexhaustible. They require little expenditure of capital and but little skill to work, while on the other hand, the demand for the article appears to be only limited by the means of transport, and it may be applied to a great variety of purposes, for which it has not hitherto been used. The profits on the dishes are said to be high. They are valued according to their powers of resisting the effects of heat. The vessels made at Tickree and Darhee in Dholbhoom are the most prized. It will easily be understood how much the trade in a frangible and bulky article, such as this is likely to be increased by the construction of cart roads.

Ochre.

Red Ochre abounds in Pergunnah Sarunda in the Government Khasseh Colehan. It is carried away in all directions in small quantities. In the country, it is chiefly used for imparting a red colour to cloth. It is obtained at the surface without any trouble in digging. Yellow ochre is found in several places in Khursawa, and is also applied to the same use as the red ; a white and pink coloured earth from a soft slate or schist is found in several places. The former is used by the Hindu residents for whitening the walls of their houses, and is sold in the bazar of Chota Nagpore as chalk.

Corundum.

The true Corundum is not, that I am aware of, found anywhere in the Singhbhoom Division, but several varieties of stone applied to the same purposes abound ; for want of a better one, I class them under this head.

Garnitiferous schists exist in several localities, Jamsore in Dholbhoom is the only place known to me, where the mineral is considered hard enough for lac wheels. Here it may be obtained to any

extent from the rock in the bed of the Sooburn Rekha, which is soft and easily broken.

At Khujoorda in Khursawa crystals of schorl are found in a decomposed schist. These are also used in place of Corundum by the native smiths. The supply is unlimited, and they are found at the surface without digging.

At Jugurnauthpore south of Chyebarra, a rock exists, which is much used by the smiths of the country. It appears to be composed of quartz and oxide of iron. The stone is dug out on the banks of an old tank, the waters of which are supposed to give excessive hardness to steel tempered in it. The supply of the stone, obtainable with trifling labour, may be considered almost unlimited.

At Chyebassa near the first bridge over the new road to Serikela, I found a stone reposing on decomposed felspar with dikes of decomposed trap, which was pronounced by the Deputy Commissary of Ordnance to be superior to the last mentioned rock. Both were considered in the Arsenal as too soft for metal-cutting, but the inferior sort from Jugurnauthpore is in general use for the purpose in Singhbhoom. The rock seems to me to be a species of calderite.

A silicious sandstone, much used by the Coles about the station of Chyebassa for tombstones, is highly prized by the sepoys of the Ramgurh Battalion for cleaning their arms, I suppose it to resemble agalmatolite in its qualities.

I have procured what appears to me to be a coarse garnet, some of the crystals of which are as much as two inches in diameter, from Erkee in Tamar on the northern boundary of Singhbhoom. It is supposed to afford a superior article for metal cutting wheels, and is in general demand among the ironsmiths in Chota Nagpore. It is said to be superior to any of those enumerated, and, if we may judge from external appearance, the opinion is not unfounded. It is found on a little rocky eminence east of the village, also in the plain further eastward, and in the jungles of the Raboo Ghat. The supply is unlimited, and the matrix being completely decomposed, it is dug without any difficulty.

I have been induced to mention these stones, as the greater part of Europe and America and even Calcutta is supplied with emery by the petty Grecian island of Naxos. Here we have substitutes

at hand, which if not equal to the produce of Naxos, may at any rate be obtained at a very trifling cost, and will probably answer for many of the purposes to which emery is applied. I fear there is but little ground for hope, that coal may be found any nearer than Pachete, but even should it be discovered within the district, the iron could hardly compete with the produce of Europe in Calcutta. If found at all, I think it must be looked for in the south-east of the district, where the difficulties which oppose the formation of roads are greatest. I look upon the copper ores, potstone and coloured earths, as the most hopeful sources for speculators. The climate almost forbids any attempt on the part of Europeans to render the gold-washings productive.

In conclusion, if I may be allowed to express an opinion on the subject, I would say that a careful examination of the district, would probably yield many other minerals than those enumerated, should this paper induce the Government to depute a competent person for the purpose, I shall deem my labour amply repaid. Catalogue of minerals to accompany a memorandum on the geological features and mineral resources of the Singhbhoom Division South West Frontier Agency.

A } Collections of specimens from Dhoba Pahar, Kalkapore,
 B } Badea, and Kamarara in Dholbhoom illustrative of the geology
 K } in the neighbourhood of the copper diggings.
 M }

C. 1. Sand formed by the decomposition of trap. It is from the high road between Berkela and Porahat. The sand is attracted by the magnet, and is forwarded for examination as to whether it does or does not, contain any other useful mineral.

2. Sand (chiefly iron) from Roro and Eleegara rivers, it is supposed to be exhausted of gold by the usual process of washing, and is forwarded with a view to examination for other minerals; also it is thought that a considerable amount of gold remains after washing which may be extracted by amalgamation.

3. Gold and the residuary sand from which it was obtained from the Eleegara river.

4. Sand from Roro river supposed to be exhausted of gold: Its gold in a separate packet.

4. A. Ditto supposed to contain gold (3 packets.)

5. Sand from the feeders of the Sunjye river at Porahat supposed to be exhausted of gold. The gold in a separate packet.

6. Gold and the residuary sand, from which it was obtained on the surface at Badea in Dholbhoom near the ancient copper diggings.

7. Sand and gravel from the same spot forwarded with object already mentioned.

8. Garnet schist from the bed of the Suburn Rekha at Jamsore in Dholbhoom.

9. Garnets of the above separate. These are used by the iron-smiths of the country instead of emery, forwarded for trial. The powder should be washed to separate the lighter particles before it is used.

10. Calderite (?) found near the Jail at Chyebassa. This stone is not in use as corundum or emery, but the Commissary of Ordnance, Fort William, reports more favourably of it, than that from Jugurnauthpore, which is so used, forwarded for trial.

11. Crystals of schorl from Kujoorda in Khursawa, these are used by the native smiths as emery.

12. Stone from Jugurnauthpore used as corundum. It appears to be allied to No. 10. Commissary of Ordnance reports it as rather too soft for metal cutting wheels.

13. Coarse garnets from Erkee in Tamar. These are generally used as emery by the ironsmiths of Chota Nagpore. Forwarded for trial.

14. Iron ore from Silda (zillah Midnapore.) This is highly crystalline, and is feebly attracted by the magnet, iron is very extensively smelted from it, and bears a high character.

15. Iron ore from Khursawa district.

A. from Mouza Narain Bera.

B. from „ Bitaboaroo.

C. from „ Kundudee.

These produce a much esteemed iron. The ore closely resembles No. 14, and is more strongly attracted by the magnet.

16. A. B. C. Iron from the above ores.

17. Potstone dish from Tickree in Dholbhoom. This is the best kind produced, and valued on account of its resisting fire.

19. A. Potstone dish from Kory Kela in Parahat. This is an inferior kind, and will not stand fire. It abounds in iron Pyrites.

B. Dishes of Potstone from Doobrajpore in Seraikela, will not stand fire. The stone resembles French chalk, and probably specimens might be found, identical with that stone.

20. Trap or serpentine from a dike in a hill of Gneiss at Rycoms in the Colehan, it is very hard and might be found useful for some purposes.

21. Jaspers from the Braminee river, where the Bombay road crosses it, applicable to ornamental purposes.

22. Ditto from the Byturnee river at Jynt in Colehan.

23. Ditto from Dhoba Pahar in Dholbhoom.

24. Ditto from the Roro river in Chyebassa.

25. Copper ore from the diggings at Landoo under Dhoba hill in Dholbhoom.

26. Ditto from Jamjora in Seraikela.

27. Red ochre from Sarunda, used to colour cloth, but not as a permanent dye.

28. Coloured earth from Jamda in Colehan supposed to contain Manganese.

29. Stones from Aukoora Bhangra in Sarunda at the spot where gold is found on the surface.

30. Stones from an eminence at Assuntulled in Khursawa, where gold is found at surface.

31. Silicious sandstone from Chyebassa, much used by the sepoys of the Ramgurh Battalion for cleaning their arms.

32. Iron ore from coal formation in Sumbulpore.

33. Magnesian earth from Assuntulled in Khursawa,

34. Stone from an old digging at Chyebassa.*

35. French chalk from Lowada.

36. Iron ore from Badea, and Kunya Looka in Dholbhoom.

* It is not known, for what these diggings were made.

On the Ballads and Legends of the Punjab. Rifacimento of the Legend of Russaloo. By Major J. ABBOTT.

On Sealkote's embattled steep (1) his daily woodcraft done (2)
 Russaloo lay in slumber deep, Sahl Byne's redoubted son.
 A vision rose at dead of night, his guardian saint* appear'd,
 His robe a web of dazzling light and silvery white his beard:
 His brow was wreath'd with (3) Nurgis† flowers; his staff extend-
 ed far

Where Oodinugri's‡ distant towers bask 'neath§ Canopus' star.
 High rose from cot and palace fair, from tower and stately fane
 The groans of thousands, weeping there, friends, lovers, children slain.
 Seem'd it, as all the woes and tears, that ancient site which dower
 From ages of unmemoried years, reviv'd in that drear hour;
 And listing deep, Russaloo felt his generous nature glow,
 And 'neath the starry heavens he knelt, and breath'd his fervid vow.
 "So help me all ye Heavenly Powers! sun, moon refuse your light,
 "And golden-throned stars withdraw into the void of night;
 "Ye winds, who waft on dewy wing spring's freshness, mountain born,
 "The rosebud's fragrance careless fling, pure health from waving corn,
 "Die 'mid the sweets your wing that cloy, nor fan my feverish brow!
 "Ye crystal springs whose thrill of joy, earth's azure arteries know,
 "In steamy jets heaven's sapphire blot, or through earth's clefts
 subside

"And in hell's dismal caverns rot, a foul polluted tide!
 "And thou Pavahk, dread fire king, hear, recall each genial flame,
 "That with thin air and water clear, upbuilds this mortal frame,
 "If pleasant food my palate cheer, or slumber seal mine eye,
 "Or minstrel harp shall soothe mine ear, with deeds of days gone by,
 "Until the robber bite the dust, and heav'n's benignant ear
 "Of mirth and joy, its sacred trust, not vainly list to hear."

* Devarchies. Deified saints of Hindoo Mythology.

† Nurgis. The Narcissus, common in the North of the Punjab.

‡ Oodinugri is the ancient name of Lahore according to tradition.

§ Canopus in the Punjab is seen but a few degrees above the Southern horizon, and from Sealkote appears to hang over Lahore.

The vision fled, Russaloo woke, in arms of proof array'd
 His hero limbs, and pois'd and shook his trenchant battle blade,
 And jealous scann'd its surface blue, lest haply stain impair
 Or dim the pure ethereal hue, baptiz'd in* fire and air.
 The flexile mail around him clings, blue steel and ruddy gold ;
 O'er this the surcoat rich he flings, whose every (4) vital fold
 Is fenc'd with damask plate of proof, which prison'd Genii frame
 Beneath the mountain's cavern'd roof in red Volcano flame.
 His father's shield, his father's sword, the bow of steel, which none
 From (5) Bruhm, the empire's first dread Lord, to this his hero son
 Could bend, but which Russaloo's might like twig of osier plied,
 Whilst every dart (6) that err'd in flight, rebounded to his side.
 Such were his arms ; no flaring gleams their hue celestial mar,
 But from his eye heav'n's vengeance streams, a bright destroying star :
 And such the life, grace, power and joy his every gesture shows,
 The air seems made his step to buoy and glistering round him flows.

No rest his gallant courser knew, till o'er those verdant bowers,
 Where Ravi leads her current blue, rose Oodinugri's towers ;
 A battlemented mass immense, ramp, bastion, gateway high,
 Whose slender obelisks streak intense the sapphire-vaulted sky :
 A lean dog howl'd before the gate, no sign of life, beside,
 Rose from that city desolate, where roar'd of late life's tide ;
 No warder watch'd the massive port, no turban'd troop stream'd
 through,

But o'er the foot-worn, terrac'd court, the dank weed frequent grew :
 And as the steep ascent he clomb, his hoof sounds scar'd the rest
 Of vampire bats which make their home, where man's last home is drest.
 He pac'd the silent street.—One form, so wan, so pale, it might
 Be the sad ghost who rides the storm, flitted before his sight.
 As broke the long-unwonted clang, she vanish'd, shrieking, " Woe :"
 That thin voice like a death knell rang, it ic'd his bosom through.
 " Woe ! woe !" the faint, unearthly cry fill'd all that city lone,
 The empty walls, the hollow sky were peopled with a moan.
 High tower'd the fort with menace vain, wide-ported halls appear'd

* The cast steel of sword blades forged in the East is generally too brittle to bear the plunge into water, and is tempered either in air or in oil.

And many a graceful, snow-white fane, its antique obelisk rear'd ;
 And 'neath the lordly palace frown, crouch'd low the ragged cot,
 Pomp o'er pale Squalor scowling down, their common end forgot.
 And many a graceful date-palm stream'd her tresses o'er the sky,
 The Peepul's fluttering masses gleam'd in tints of warmest dye :
 But on the fortress crenell'd wall, no archer bands appear,
 No banner's wave, no trumpet call, no gleam of slender spear ;
 And from the fane no tinkling (9) bell announc'd stern Sheeva's rite,
 Nor shrieks of conch his orgies swell, nor priests who hymn his might,
 No bearded Synod courts the shade, the* Peepul (8) glooms alone,
 Each leaf a restless sprite hath made his own peculiar throne.
 At length before a portal high, his steed Russaloo stay'd ;
 For here at length one plaintive cry life's latent spark betray'd.
 He left his steed without the gate, a hall before him spread,
 Where o'er the hearth a matron sate and drest unleaven'd bread.
 Above the brightly glowing brands, her wither'd person hung
 And whiles she wept and wrung her hands and whiles she wildly sung.

Song.

Ah ! well a day ! Ah ! well a day !
 The sun lights up the dawn,
 With gems bespangles bower and spray,
 With flowers the dewy lawn.
 The ray that sparkles sheen and coy,
 That self-same joyous ray
 Consumes the widow'd mother's joy,
 My child !—Ah well a day !

2

Ah ! wherefore gleams that ray so bright ?
 Why bloom the flowers around ?
 But that in gulf of blacker night
 Her desolate soul be drown'd ?
 Yet men thee call the merry, merry sun ;
 Nor falsely thus they say ;
 For widow's tears are mirth to none
 But thee.—Ah well a day.

* The Peepul is an aspen. The incessant flutter of its leaves is attributed to restless sprites inhabiting them. The young leaf has a rich hue of Indian red.

3

The headsman robes his brow in gloom
 Enshrouds his form in night,
 In pity of his victim's doom,
 Whom thou bemock'st with light.
 Ah ! falsely smiling, heartless god,
 On thee my curse I lay :
 Fate blot thee in thy victim's blood
 From heav'n—woe, woe's the day.

Thus weeping singing still, the while, she drest the bannocks fine ;
 On either side a mountain pile had serv'd a host to dine.

Russaloo spake : " What mean these tears, this desolation wide,
 " Yon pile (10) of bread might feast for years the* Pandoo in his pride.
 " On either side the spacious way, fort, palace, mansion stand,
 " Bazaars so high, at noon of day they shadow deep the land ;
 " But, save thyself, no living thing hath cheer'd mine aching sight,
 " What curse could such wide mischief fling, this deadly, general
 blight ?
 " Cease thy sad weeping, mother mine, be sure I'll freely shed
 " My blood to staunch those tears of thine, and guard thy reverend
 head."

" Why do I weep ? Ask rather why tears yet remain to flow,
 " That plenteous floods have fail'd to dry their deep, lone source of woe:
 " Seven noble sons around me grew, the least had grac'd a throne ;
 " Blest in their love my moments flew, their love was all mine own,
 " For none the spousal rite had shar'd. They took the spoiler's eye,
 " One only youth his greed hath spar'd :—to-morrow *he* must die.
 " Thou whom the beard and turban gay man's stern estate attest,
 " O ! Rider of the dappled grey, arm well thy warrior breast ;
 " He comes, he comes, the monster dire, who wastes us in his wrath,
 " Before him walks devouring fire and famine dogs his path :
 " And were an hundred heroes' might in thy right arm alone,

* The Pandoos in India are the remotest of the heroic races. Every grand ruin of antiquity is ascribed to them.

"Thou could'st not cross his blade in fight, nor live before his frown.
"A monstrous race, of gods and men, the mix'd and spurious (11)
brood,
"The cavern'd mountain serves their den, man's flesh their daily food;
"The winds, the lightnings half obey spells taught of their dread sire,
"They walk in whirlwinds heaven's highway, yclad in clouds and fire.
"Four brothers form the monstrous rout, the least of mountain height,
"Chindia, Pehoon, and Pugrbutt, and Tera fourth in might;
"A sister young, Bëera nam'd, their monstrous banquets shares,
"For more than mortal beauty fam'd, for wiles and deadliest snares.
"The warrior finds her weeping sad, beneath the greenwood tree,
"They've robb'd and left a hapless maid, woe, woe alas! is me;"
"He bids her mount his gallant steed, her arms around him throw:
"That serpent clasp shall ne'er be freed, till droops thy lifeless brow:
"Away, away, like meteor fly, pale corse and laughing grace,
"A fair day's sport: who next will try the young maid's soft embrace?
"Daily the lot our rulers cast for victim young and fair,
"To serve the Rakuss' foul repast, that he our city spare.
"Six times upon this widow'd head hath fall'n the fatal lot;
"Again the dire decree is sped my heart's last joy to blot.
"No eye regards the widow lone, none hears the orphan's plain,
"The heart of man is granite stone, and heaven looks down in vain."

"Cease woman," cried the prince severe, "blaspheme not heaven's
dread love,
"The widow's prayer, the orphan's tear shrine in the courts above.
"And if heaven touch man's stony heart, it melts to tenderest mood,
"The timorous acts the hero's part and courts the feast of blood.
"Commit thy child to heaven's blest care, put up thy vows for me,
"For I am sworn his lot to share, to bless or die (12) with thee."

She fell before his noble feet, with kisses bath'd and tears,
"But go not forth," she cried, "to meet the doom my soul for-fears;
"Thou could'st not save my hapless child, would'st share the dire
decree,
"One added woe were o'er me pil'd t' have curst and blighted thee."

Fytte 2nd.

How merrily dawns the jocund morn o'er the city that aye is gay,
When the warder is winding his mellow horn, and the young bird is
trilling his lay ;

And youth and age and manhood stern and beauty matur'd in grace,
And childhood's fetterless footsteps turn to the silver wave's
embrace.

But not o'er Oodinugri's towers, woke life with waking day :
No young bird charm'd those smiling bowers, nor young maid
carolled gay.

No warder dar'd his cornet wind, no priest his conch to fill,
The portal stood fast barr'd and blind, glid past th' untasted rill ;
The screech owl reign'd without a peer, save when the raven's croak,
Or wolf's long wail, so sad and drear, that dismal jargon broke.

Russaloo back'd his gallant steed, the youth a palfrey low,
And on they prick'd along the mead to seek their giant foe.
But not until, with anguish wild, the aged dame had prest,
To her sad heart, her lov'd, lost child and oft and o'er carest.
At noon the Neel* Raos (13) silver wave laps'd past them free and fair,
Russaloo plung'd his limbs to lave and told his warrior prayer.
There rose a mist from out the wood, a whirlwind wrapt it round,
Till in 'mid heaven the column stood, and shape and substance found.
Fork'd lightnings flash'd around the brow, deep thunders pealed their
roar,

And in Russaloo's heart 'gan grow a chill ne'er felt before.
Majestic stalk'd that column tall the yet disparting ground,
The clouds their heavy folds let fall in massive drapery round :
But what those folds conceal'd from view, thought shudder'd e'en to
guess,
As broke some startling glimpses through of loathly hideousness.

And now upon the streamlet's brim, high towering in 'mid sky,
Pauses the column, gaunt and grim, whence keen, blue lightnings fly :

* I would willingly have spared the reader and myself this combat, but that it forms so essential a part of the tradition.

A voice which caus'd the life blood freeze shook all th' affrighted
strand,
And from that shroud, the youth to seize, came forth a giant hand.
Aghast, his eyeballs glaz'd and set, his palate scorch'd and dry,
His joints unstrung, denying yet the power to shrink or fly :
The hapless victim sate, one yell, despair's own freezing tone,
Forc'd his parch'd throat, then strangled fell, a faint and piteous
moan.

Russaloo mark'd with other eye, to heaven he inly pray'd,
Then whilst his steed rear'd wild and high, unsheathed his battle-blade.
Down flash'd the steel, a clear blue flame, such heaven's dread
armoury swell,
Sheer thro' the wrist gigantic came ;—the huge hand weltering fell,
Spouted the hot, red torrent forth, the writhing monster's roar,
Of pain and shame and coward wrath, the free wave backward bore ;
He yells, he flees, stride urging stride, the cloudy mantle roll'd,
Round his gaunt form is scatter'd wide in many a giant fold ;
And now some monstrous limb breaks thro', now towers his shaggy
head,
Like forest-tangled mountain brow, whose eye the watch fire red.
His knees the waving forest rend, huge trees uprooted lie,
Like grassy tufts, that crash or bend, when the merry hounds give
cry :
And such the tumult, roar and din, as when Pavahk's* dread ire,
The wild Maroots† incense to win man's realm with girdling fire.

His mighty brothers mark'd his flight, half wondering, half in dread ;
“Up, up,” he cried, “while haply flight avails to screen your head,
“The hour foretold in wizard lay, that hour of dole and doom,
“The rider of the dappled grey, the man of fate is come.”
Thus Tera, as he fled amain nor respite knew nor stay
Till leagues six score and rivers twain, twixt him and vengeance lay.
Splash thro' Chenab's swol'n stream he strode, his knee the surges
found,

* God of fire of Hindoo Mythology.

† Maroots the winds.

From Mungla's* (14) cliff Vidustá's† flood clear'd at one giant bound:
 Dhángulli's‡ (15) vast ravine and rock his footsteps' thunder bore,
 And echoes wild reverb and mock the crash in one long roar.
 Thither for refuge had he fled, but each dire echo there
 Renews the giant's frantic dread, inflames his wild despair.
 O'er Potowarr's§ ravine-worn waste, by Maunkyala grey
 The monster bounds in frantic haste, Earth crouches in dismay.
 Swift thro' Margulla's|| (16) strait he shot. Hurróh purl'd bright
 and clear
 And rose, heav'n's purpled sheen to blot, thy splinter'd ridge (17)
 Gundgurbh,
 Long-back'd, dark-hued, high-crested, lone, it seems to mortal scan
 By spell of age transform'd to stone, some huge Leviathan.
 And Tera joy'd as he beheld, the stronghold of his race,
 Whose crags inviolate, yet may yield, a safe abiding place.
 He nears the base, ten active bounds,¶ Pir-t'han receives his tread
 Each wizard glen, each cave resounds and quails the mountain head.
 From crest to base was felt the shock, blue Aba Sinde the roar,
 From each time wrinkled cave and rock in thunders thrice told o'er;
 And mortals trembled far and near, for well that sound was known,
 The monstrous Rakuss, name of fear, sealing his blood drench'd
 throne.

Meanwhile doubt shook each giant's mind. The son of king
 Sahlbyne,
 They knew by fate's stern will design'd to close their mighty line.
 And they had turn'd their backs in flight, but that Beera's voice

* Mungla, Mars. A celebrated castle upon a cliff on the eastern brink of the Jelum, where it emerges from the mountain.

† Vidusta *ῥῥασπης*, at present called the Jelum.

‡ Dhahngulli, the deserted site of the palace and capital of a branch of the royal family of Gukkur.

§ Potowarr is the table-land between the Indus and Jelum, bounded north by the roots of the Huzara, Khaunpoor and Sutti mountains and south by the scarp of the salt range. This is the ancient limit.

|| Margulla, the pass of that name from Potowarr into Qatur.

¶ The highest crest of Gundgurbh, about 4,500 feet above the sea, is of limestone.

Arose in all its silvery might, to shame their dastard choice.

"What, not *one* blow? And will ye flee, ye god-descended crew,

"Mindless of name and fame and me, who this vile recreance view?

"The very squirrel guards her nest, the lapwing takes not flight,

"Until at least her foeman's crest, salute the trembler's sight;

"But ye, of bulk so huge, of soul less than might serve to fill

"A squirrel's frame, can flight control fate's dark inviolate will?

"To fate pertain life, death; but we ourselves suffice alone

"To live from self-reproval free, and die in fair renown."

The woman's greater soul prevail'd, Pehoon and Chindia strode
Each in his cloudy mantle veil'd. Earth shudder'd as they trod.

Pehoon upheav'd a trident vast, that wont on each huge prong

An ox entire to rivet fast, 'mid mirth and jovial song.

Its crest high pois'd a tall Chenarr,* the forest pride and stay,

Chindia the stem uprooted tore and rent the limbs away.

A mighty rod whose lightest thwack tho' playfully it fell,

Had crush'd primæval Mammoth's back or shiver'd Kurma's† shell.

But Pugrputt drew forth his sling; an elephant's hide entire

The thong, two cables serv'd for string, a rock the missile dire,

So vast, that ship of mightiest beam, of all which swell thy state

Dread Ganges, heav'n-descended Queen, had sunk beneath the weight.

Such pebbles in his scrip he bore, the burliest son of might,

But recreant to the immost core, his thoughts were bent on flight.

And still he loiter'd, plucking now some taller Simbhul's‡ head,

Or whistling shrill as tempests blow round Bhaingra's§ peak of dread.

Soon as Russaloo met their eye, mirth stirr'd the giant brood,

Was this the foe they needs must fly, athirst to quaff their blood?

Their laughter shook th' affrighted earth, like thunder-peals it rang,

Old Pir Punjaul|| enjoy'd their mirth and echoed back the clang

* The Chenarr or Oriental plane, the noblest of forest trees. It is not indigenous to the Punjab, although it will grow there readily from slips.

† Kurma, the fabulous tortoise, who supports the elephant Ihrawut, who supports the earth.

‡ Simbhul of the Punjab, Saymul of India, the Indian cotton tree, the loftiest tree indigenous to the country bearing a large red flower.

§ Mount Bhaingra an isolated summit in Huzura about 8000 feet high.

|| Mount Pir Punjaul the elevated range walling in Cashmere southward.

Full three-score leagues. With other eye Beera mark'd the foe,
 "Who dares," cried she, "our wroth defy, thy name and lineage
 show."

Replied the prince "Great Sálábyne, my sire, afar renown'd,
 "High Sialkote's dominion mine, Russaloo nam'd and crown'd."
 "Hoh! brother," Chindia laughing cried, "our fate before us stands
 "Shall we to glut his maw abide or flit to foreign lands."
 His trident pois'd Pehoon and laugh'd, three roods advanc'd his
 stride,
 But good Russaloo's fatal shaft curb'd his presumptuous pride,
 Where arm and cubit jointed grow, the broad shaft passage found,
 Keen as the levin's fiery blow, it dealt a ghastly wound.
 The ponderous trident plung'd to earth and where its fangs deep
 gore
 Old Preetha Mata's* breast gush forth streams welling evermore.

Enraged to view his brother's plight huge Chindia dealt a blow,
 Had ground to dust the ranks of might of Urjoon's countless foe.
 Like fifty tempests hissing down the monstrous club held sway,
 His gallant charger's speed alone Russaloo's fate might stay;
 Levell'd the crackling forest fell, as when on harvest morn,
 While shouts the reapers triumph tell, falls the ripe golden corn.
 Russaloo might not bide that blow, yet as he scour'd the plain,
 Drew with full force his strong steel bow: the shaft sped not in vain;
 Crash thro' eye, scull and brain the steel held its dire way,—and
 thrown
 Like mountain in the earthquake reel, the giant corse rush'd down.
 With such a shock, (18) each river flood, of five that mightiest roll'd
 Their waves surcharg'd, arrested stood, each o'er her† sands of gold;
 And Oodinugri's castled towers fell crumbling o'er the plain,
 And trembling nations sought the powers of hell and fate in vain.

Then Pugrputt in wild dismay slung, ere he turn'd in flight,
 A ponderous rock, the landmark grey, where rival states unite;

* Preeth, the earth, Mata, mother.

† The sands of all the Punjab rivers abound in gold dust. According to Hindoo Mythology all rivers, even Sinde Rania, are female deities.

Four thousand years the shepherd's throne whence he afar might
view

His fleecy charge : the granite stone in a storm of music flew.
Ploughing the earth four fathoms down and hurling splinters far,
Huge trunks of trees and rocks upthrown to dim day's golden star.
No courser's speed had then avail'd, but that the monster's sight,
Dazzled by palsyng terror fail'd, the missile err'd in flight :
Clearing a province at a bound, th' enormous mass bowl'd on,
Till in blue Sootlej depths profound firm fixt an islet lone.

Now fled the Slinger dire apace, but first up-caught and bore
Beera's form of matchless grace, pale as the lily flower.
Pehoon in Tera's footsteps fled, till heav'd Gundgurb in sight,
But Aba* (19) Sinder inviting spread, his sheeted silver bright :
He wades, imbibes the ice-cold flood, then turns an anxious eye,
Where dread (20) Aornos' forests nod far mid the azure sky :
Thither he fain had fled but pain unnerv'd his giant pride ;
He sank to rise no more again, from that cold gliding tide.
There, when his latest breath was past, his wounded brother came
And pil'd the rocks and forests vast to hide his giant frame ;
And still the (21) tomb his name retains, an islet rock that now
Mid Aba Sinder's full, azure veins uprears its castled brow.

Fleet on the Slinger's traces came Russaloo's noble horse
That steed of purest strain and fame, unmated in the course.
Thrice strain'd the prince his bow of might and thrice his keen alarm
Lest he the beauteous maiden smite unnerv'd his manly arm ;
A fourth essay, the winged steel on mission dire hath flown
Hath deeply gor'd the flying heel, and brought the monster down.
And stern Russaloo's blade is bare, comprest his lips, his brow
Lowers o'er the eye's dilating glare, like storm-cloud charg'd with
woe ;

But Pogrputt rehears'd (22) a spell, and o'er his frame entire
A magic influence instant fell ; down flash'd the blade of fire,

* Aba Sinder. Father Sinder, the name given by the veneration of his borderers to the noble river Indus. The Hindoos however style him Sinder Rania, Queen Sinder.

But not to cleave its gory path : the massive granite rock
 Receives and foils the hero's wrath, yet shivers in the shock.
 Amaz'd he glares on all around, mistrusts his reason's ray ;
 Where cumbering late the groaning ground, the monster weltering lay.
 A huge grey ridge of rock alone juts from the sandy plain,
 And mimics rude in granite stone some mighty giant slain ;
 Of monster, maid, sole visible trace ; around the rock he rides,
 Assails it with his steely mace. The rock his wrath derides,
 Till with the fruitless toil distraught and warn'd by fading light,
 A Dhurmsála* lone he sought and couch'd him for the night.

Fytte 3rd.

Meanwhile, within a cavern'd hall Beera lay reclin'd,
 Pondering her glory's darken'd fall with tempest shaken mind :
 Now o'er her mighty brother's fate the tears unbidden rise,
 Now with revenge and deadly hate blend love's insidious sighs,
 Despite her rage and shame and woe, her woman's heart is won,
 As tigress mates with but the foe, whose might excels her own :
 The dismal gloom around her spread were utter, Ethiop night,
 But that her flashing eyes still shed an ever-changeful light ;
 And that above her hung ^{sus}pent (23) carbuncle large and rare,
 Which through the gloom its radiance sent, like Sirius' burning star.
 Rich sculptur'd gold and ivory rare her beauteous form uphold,
 Rose-tinted silks make doubly fair, those limbs of faultless mould.
 But save her loveliness alone and proud, fierce innocence,
 No robe the maiden e'er had known, nor felt shame's withering sense.
 Above the cavern's roof reclin'd her mighty brother lay,
 Sense, life in solid rock confin'd, a mass of granite grey.

The maiden's beauteous cheek was pale, her brow was flush'd,
 her eye
 Suffus'd with tears which ere they fall, the flashing lightnings dry.

* Dhurmsala, Hall of charity. The Hospitium of the Hindoo.

"Immortal author of our line Kuveera* (24) dread," she cried,
"For what unblest, perverse design thine offspring's might and pride;
"Lords of the earth to day we mov'd, but frames of giant might
"All uninform'd with soul have prov'd; earth, heaven hath seen our
flight. [sire,
"What owe we thee, dread father, say, that thou should'st be our
"Yon lumbering forms, death's easy prey, or souls of glowworm fire.
"Are gods than mortal men less wight, that from the union rise,
"Souls shrunk and dwindled in their might, whilst form dilates
in size;
"Recall thy bitter gift of life, since thou hast not to give
"The fame which gilds our being's strife and makes it life to live."
Thus in the cavern'd gloom she pour'd her wild reproachful cry,
And from the rocks in deep accord, uprose a mournful sigh.

Dreams broke Russaloo's toil-worn rest, mid strife and vision'd
woes,
To calm his tempest-shaken breast his guardian (25) saint arose:
Benignly o'er the prince he smil'd, then as he vanish'd slow
In Ravi's current, rippling wild, seem'd beck'ning him below.
The Raja burst the bonds of sleep and donn'd his azure arms,
Whilst stars of heaven sweet dew showers weep, bright in neglected
charms.

Beneath him far meandering spread, the Ravi's twilight flood,
Fring'd with dense groves of gloom and dread, a spirit haunted wood.
Calm as young maiden's sinless rest, ere love hath taught a sigh
Or care hath dimm'd her spotless breast, the starlit waters lie;
For ever rippling clear and bright, the blissful current flows,
No rock to break, no cloud t' affright her musical repose.
Blest in the water's sweet embrace a fairy island smil'd,
Three trees of noblest growth and grace, war'd o'er the flowery wild;
And fondly droop their foliage down, the gliding wave to bless,
Which, coy as maiden, dances on and shuns the soft caress.
And through the foliage gleaming fair a snowy fane aspires,
Enshrin'd as Wood-nymph, chaste and rare, sweet mark of pure
desires.

* Kuveera, one of the inferior deities. God of wealth.

She bathes in æther soft above, in crystal clear below ;
The stream hath dread to mar or move her shadow in its flow.
The foliage, mass'd her form to wreath amid the starlit sky,
Droops round her in the flood beneath, where broad its masses lie.
No lifeless pile of stone appear'd to greet Russaloo's eye,
But rather spirit shape rever'd, sweet, solemn company.
And as the hero deeply gaz'd, a meteor large and bright
From the high zenith glancing blaz'd, cleaving the void of night
With flood of crimson, green and gold and violet's softer ray :
The glorious Orb majestic roll'd down heaven's star-spangled way ;
Linger'd above the fairy Fane as loth to quit her sight
Then waveward led its glittering train and set in utter night.

Russaloo's heart throbb'd full and high, he bless'd the gracious sign,
He hail'd that herald of the sky, fresh from the hand divine.
Adown the steepy cliff he sprang, attain'd the rolling tide,
Flash'd the bright wave ere yet the clang of arms and armour died.
His vigorous arm subdued the flood, which fled the strife, dismay'd,
And soon on that lone isle he stood, beneath the starlit shade ;
A pillar'd porch (26) of marble stone gave access to the shrine,
Whose massive obelisk purely shone, to lure to rites divine.
Within the cell hung wreathen flowers, a youthful mother's vow,
Had strung t' appease the gloomy powers, who govern death and woe,
He search'd the sacred area round, if outlet there might be ;
His foot an iron ring hath found, he grasps the massive key,
With force unknown to mortal wight upheaves the ponderous stone,
Whose weight had baffled human might for centuries unknown.
A flight of steps led darkling down, into the cold earth's breast,
A clammy wind with fitful moan, Russaloo's sense opprest.
Yet without pause the dive is made, groping his rayless way,
Sole guide his bare, protruded blade, heaven's grace his only stay.
And thus for miles, that entrail dark, so narrow, dank and lone
He track'd, uncheer'd by faintest spark of light to guide him on.

At length, when hope wan'd faint and low a distant gleam he spied,
Such ray the charnel oft will show, where rot man's power and pride.
And, as he (27) near'd the mystic light, two globes of dull, red fire,
Set in the rayless void of night, surmises strange inspire :

And high above the cavern grew and wider spread around,
 And freer breath the hero drew, the night gloom'd less profound;
 And those red orbs intenser glow'd, and 'neath them gushing aye
 A vaporous flame incessant flow'd, of pale, blue, spectral dye.
 Some monstrous living thing seem'd there to hold his leaguer dire,
 Known by his eye-ball's baleful glare and breath of sulphurous fire.
 A sound, faint heard from far, from near, of many a scaly fold,
 Wounding with muffled clash the ear, as each o'er other roll'd;
 Dimly the serpent shape defin'd to fancy's startled eye:—
 How 'mid that darkness dense and blind shall he its might defy.

Full at those glaring orbs he smote:—the temper'd scales gave way;
 But the slope crest and flexile throat yield to the warblade's sway.
 And rous'd to strife the monster hurls his wildering coils around
 Russaloo's frame, in ceaseless whirls of death's cold potency bound.

'Twas then a star which long had shed its ray, to mock the sight,
 Blaz'd forth in full effulgence red, flooding the cave with light.
 Blest, heaven-sent ray," the hero cried, as at each mighty blow
 Which hew'd the monster's scaly side, the blood red torrents flow;
 Yet spite his more than mortal toil, the deadly folds creep round,
 Till in their clay cold massive coil, his struggling frame is bound,
 And the dire fangs his throat invade:—he plung'd his dagger'd hand
 Down that dark gulf, until his blade the jaw's black chasm spann'd.
 Those hellish jaws clos'd crashing down, and thro' the palate driven,
 The keen, thrice temper'd blade held on, until life's shrine was riven.
 Then droop'd the languid head, then fell;—but the death-struggle 'gan
 And with an ocean's sway and swell thro' those vast volumes ran;
 Tugging the strangling coils amain, with vast, spasmodic throes,
 And mightier seem'd the monster slain, than when his proud crest
 rose.

Panting within the death cold twine, one superhuman stroke
 Sever'd at length the monster's spine, the hero's bondage broke.
 Light bounding o'er the humbled crest, once more Russaloo stands
 And lifts to heaven the heart oppress'd, to heaven the clasped hands.
 Then onward thro' the cavern strode tow'r'd that mysterious light,
 To whose thrice welcome ray was ow'd his triumph in the fight.

In golden chain suspended hung from the black vault on high
A glorious gem, which pencils flung of each etherial dye ;
But crimson as the maiden's lip, when love with venom'd dart
Hath stung the rose he feign'd to sip, and pierc'd the trusting heart,
It's innate hue ; and all around partook the roseate dye ;
And still where warmest hues abound, bright golden flashes fly :
And basking in that wondrous ray, hemm'd in with night profound,
A beauteous maid extended lay in slumber's trammels bound.
One arm of rounded ivory o'er the downy cushion hung,
From whose bright coil its silken store the sweet head graceful flung.
In many a rich, unfetter'd fold, as from an urn most rare,
Gush'd the bright stream of wavy gold, the rich, dark, auburn hair,
Strewing the carpet's velvet fine :—the roseate pillow well
Reliev'd her features' faultless line, her soft cheek's matchless swell,
The slender throat's transparent sheen, the polish'd shoulder bright,
And one sweet orb that half was seen, half shunn'd the gazer's sight.
Pale was the cheek as lily flower, when roses bloom around ;
Tranc'd the blue eye's soul kindling power, in slumbers hush profound.
Yet scarce the lids soft-feathery snow, their radiance might confine,
Which streak'd their lustre teeming glow in many a violet line.
And where the long, black lashes lay, like children of the night,
Hush'd on the spotless breast of day, o'erflow'd th' excess of light.

High is the privilege thus to bend o'er beauty's hallow'd rest,
Scaring afar each lawless fiend, might desecrate the breast.
And aw'd by influence new and sweet, he breathless hung the while,
And fain had still'd the heart's wild beat, the vagrant Fancy's wile.
As o'er some star-watch'd mountain lake, the jealous breeze will fly,
An instant, heav'n's blest image break, then mocking, whirr on high.
So, whiles o'er that translucent brow, slight, ruffling shadows veer,
Now clench'd the fairy hand of snow, now starts th' unconscious
tear.

Again as in an April sky, the transient shade is flown,
Sweet peace hath calm'd the curtain'd eye and made the brow her
throne.

The lips their rubies half dispart, half show the pearls enshrin'd,
The vermeil tides which warm her heart, her cheek's cold lilies find.

Morn never flush'd Cashmera's lake, with richer, rosier dye,
When myriad flowers from sleep awake with her in bloom to vie.
The cheek's bright calm a dimple breaks, a whirlpool, sweet and lone,
Where giddy love his helm forsakes, resistless hurried down.
The lips half smiling, trembling play, bliss thrills Russaloo's frame,
When in a murmur, sweet as they, he hears her breathe his name.
Then, with a sudden, deep drawn sigh awoke the slumbering maid,
And languid op'd the curtain'd eye, and keen amaze betray'd,
For statue-like before her stood the form her dreams portray'd,
His azure armor stain'd with blood, his surcoat rent and fray'd ;
The warblade propp'd his better hand, the turban's sable hue
O'er features stern and forehead grand, a shadowy potency threw,
From which the high arch'd falcon eye, had gaz'd death's terrors down,
Its soul of radiance, calm and high, concentrated on her own.
The slayer of her mighty race, the man of fate and fear,
In all his godlike strength and grace ; her proud heart's Lord stood
near. [keen,

Then first, the maiden terror knew ;—then first, shame's anguish
And rising half, around her drew the envious silken screen.
And on her mighty brother call'd, then conscious of his plight
Rehears'd the spell, whose sound appall'd each shadowy friend of
night.

Trembled the stable earth beneath, the massive walls around,
The surly thunders spent their breath to thrill that dreadful sound ;
The granite roof took form and life, and 'mid the starry choir
Huge tower'd the giant, arm'd for strife, red roll'd his eye of fire ;
But bent Russaloo's mighty bow (28) and ere th' upheav'd rock
Can fall, transpierc'd that cliff-like brow : he stagger'd to the shock.
He nodded, bow'd, with hideous roar, plung'd from the starry height :
His fall, the prince imperils more, than all his living might ;
But anxious for the maid alone o'er her Russaloo bends,
To buy her safety with his own, his sheltering might extends.
No mother o'er her first-born child e'er hung with tenderer care,
When rav'd the tempest, bleak and wild, 'mid forked fire-bolts glare.

As rushing from the starry sky th' enormous ruin fell,
Earth's frame beneath, heaven's vault on high dread chaos claim'd to
quell,

And tho' one giant hand alone imping'd the hero's crest,
He sank, by that dire blow struck down, it seem'd to final rest.
Pale o'er her virgin breast of snow, as lull'd by love's warm kiss,
Droop'd the cold cheek, the marble brow, unconscious of their bliss.
That arm of might late rais'd to guard the cowering form beneath
Enclasps her, yet, with sleepless ward, caressing e'en in death.
Stunn'd by the crash, the maiden lay in brief oblivion drown'd,
But when with reason's rallying ray, she gaz'd bewilder'd round,
And mark'd that glorious form laid low, his life the price of hers,
She bow'd her o'er the pale, cold brow and bath'd it in her tears,
And with her fairy hand carest that forehead stern and high,
Where clusters clung, like Bacchus best, of hyacinthine dye,
And self-accusing, beat her breast, her golden tresses tore,
Her malison of woe exprest upon her natal hour.

Thrill'd by that soft caress to life, Russaloo's pausing heart
Throbbing renew'd his being's strife : he rose with sudden start,
And gaz'd with unbelieving eye on vision all too fair,
And marvell'd at the frantic cry, the maiden's wild despair.
Then, changeful as the heaven of spring, which, while the tear showers
start

Will from its bow of promise fling, dire fire-bolts of the heart ;
So, when the hero rose in life, whose death her soul subdued,
Shame, self-reproach and wrath held strife, loud shriek'd her brother's blood.

And with a majesty, that well beseem'd her matchless grace,
And with a fierceness naught could quell, the dower of her wild race.
Like the bereaved tigress young, she glar'd upon her foe,
Her flashing eyes their lightnings flung surcharged with fate and woe ;

More beautiful, more bright she seem'd, thus rous'd to strife and war

As, launch'd from sphere, where calm it beam'd, floods heaven the shooting star.

A dagger in her grasp she prest, with more than woman's might
She smote the hero's mail-arm'd breast : forth gush'd the lifestream bright.

Then on herself the thirsty blade with maniac fury bent,
But his strong hand the weapon stay'd and marr'd her fell intent,
Each fairy wrist with gentlest might resistless made his own,
And calm'd her Passion's frantic might with reason's godlike tone,
Till with emotion new opprest, o'eraw'd by reason's sway,
She sank upon his bleeding breast and sobb'd her woes away.

Fytte 4th.

On Sialkote's age-structur'd height and blood (29) cemented
towers

A thousand pennons flutter bright as Indra's bow of showers.
And the wide plains, afar and near, their teeming myriads yield,
And banner gay and glancing spear light up the peaceful field.
It is the young, sweet dream of spring, fair nature's jocund morn,
When flowers cut down by winter's wing in youth renew'd are born.
The happy breeze (30) from some far land her exil'd Koel bears,
The Peeluk, (31) long by winter bann'd, back to her home repairs.
Like pebble (32) bounding o'er the ice, far thro' the echoing grove,
Whose aisles resound the music thrice, that note of bliss and love,
Trills the Woodpecker's sylvan cry, while gleams his gay form, stol'd
In crimson rich and saffron dye and russett dropt with gold.
Aye and anon (33) fresh tumults stirr'd the feathery choir employ,
As back returns some banish'd bird and loud proclaims her joy.

Wak'd from his downy couch of rest in far Tibetan snow,
The sun upheaves his golden crest and life-restoring brow,
His smile responds the shadowy grove, the verdure-vested plain,
Thro' tears, once sad, his waken'd love hath made all bright again.
Softly the corn (34) its emerald waves heaves to the breath of morn,
Each islet grove and castle laves, each gnarl'd and antique thorn.
The banners wave, the banners glow, far 'mid the dewy sky,
In air-tide soft and hush'd and low, as love's own delicate sigh.
Fair nature holds high jubilee, and man once more is gay
And hails (by that strong arm set free) Russaloo's bridal-day.

And where is she for whose bright smile, lit up the festal hour?
In yon high, blood-cemented pile, is deck'd her gorgeous bower.
The merry sunbeams, streaming through, light up with golden haze
The blazon'd deeds of maidens true, and men of other days:
And on the fretted roof (35) display the marbles, chaste and rare,
With ruddy gold of rich inlay, in happiest contrast there.
And o'er the floor of marble strown, rich Persian carpets glow,
And tissues bright from lands unknown, like golden fountains flow.

But not one joyous ray breaks through the sad heart's dungeon
gloom,
To scatter far the spectral crew, whose fires her soul consume.
The young, sweet dream of woman's heart before her spreads its
lure,
From his lov'd side no more to part, while time and life endure.
Elysium bright, whose gate to bar, the fiends of Night arise,
Her own proud spirit stirs the war, her brothers' blood replies.
The shades of her redoubted race o'erthrong the bridal bower,
Their scowling brows her soul deface, quell reason's happier power.
"O! Recreant," cried an inward voice, she strove in vain to drown,
"Is this Beera's blameless choice, a sister's high renown?
"Our blood from out the desert sand, for vengeance cries in vain,
"A sister clasps the ensanguin'd hand, ere dry that damning stain."
Then lower'd anew each gloomy brow, and glar'd each dreadful eye,
And apish faces mop and mow, and hellish voices cry,
Till frenzied, from her brow she tore the gemm'd and golden hair,
And dash'd upon the marble floor, her forehead pale and fair;
And suppliant sued the monster death, by many a honied name,
With his black tide and icy breath to quench life's torturous flame.

A noble form bent o'er his bride, uprais'd her in his arms,
Kiss'd the sweet brow with crimson dyed and sooth'd her wild
alarms.
At sound of that soul-quelling tone, the demons yelling fly;
The maiden stirs; with piteous moan uplifts th' affrighted eye,
And drinks with ear athirst and soul subdued and calm'd the while
Those accents fond of high control, and suns her in his smile.
"Oh! leave me, leave me!" wild she cried, "the hosts of hell await

“To snatch from thee thy hapless bride, would ’whelm thee in her fate.

“Twixt thee and me they scowling stand, e’en while thine arms entwine

“My thrilling frame—our love is bann’d, I never can be thine.”

He sooth’d her with love’s whisper low, with reason’s lore divine,
Smooth’d each bright tress that o’er her brow far flung its golden twine,

Then led her to the terrace high, where wheel’d beneath her sight
The Jusrut’s* youthful chivalry, array’d for mimic fight.

The day wore on with pageant fair, the bridal hour drew nigh ;

A caldron vast the Mænials bear of silver sculptur’d high ;

Rich spoil of Yavan’s kingly race, a noble Font and rare,

Full many a young and laughing grace, had plung’d delighted there.

With sculptur’d forms emboss’d and drest, strange shapes of classic lore ;

There coiling hydras rear the crest, there winged lions roar.

Satyrs and fawns and Dryads troop the basement rich around,

And mermaids fair and Nereids group upon the watery bound.

Bright urns with olive oil replete, a thousand maidens bring,

In spotless robes, with naked feet, the nuptial chaunt they sing.

Into the basins vasty hold evers’d their large supplies,

Till to the jewell’d brim of gold, the sluggish tides arise.

Crackles the cedar fire beneath, up boil the unctuous waves

A gulf whose dire embrace is death, the stranded silver laves ;

And round and round the blazing bound the bride in youthful charms

And hero tried, in manhood’s pride, march with inwoven arms.

Then frenzy fir’d the maiden’s eye ; for ’mid the lurid haze

Of vapours curling wild and high in dim fantastic maze.

Ghastly and gaunt her brothers stood, as when in death they fell,

With soil deform’d and stain’d with blood from wounds that darkly well.

Each on the ghastly token laid his hand of purple dye,

And fasten’d on the frenzied maid his glaz’d and stony eye :

* The Jusrut family succeeded the Pandoos in the Punjab.

And at the sight, within her breast the nature, love-subdued,
Rallied in fierceness unrepent and yell'd aloud for blood.
They sign her to that gulf of death ; with force to maniacs known
She shrieking strove to plunge beneath and drag the slayer down.
Foil'd by the hero's gentle might, with frenzied eye she spied
His jewell'd dagger gleaming bright—snatch'd, plung'd it in her side.

She droop'd—she sank without a sigh in those love-circling arms ;
Peace scar'd wild frenzy from her eye, sooth'd all her soul's alarms.
“ Oh this is freedom, this is peace ! This, this is life,” she cried,
“ Their taunts those dreadful shades surcease, at length I am thy
 bride.
“ Thine for the brief, sweet, measur'd space, it costs life's tide to
 flow,
“ Thine in this last, fond, close embrace, all, all I e'er must know :
“ Thine in fond memory's hallowing lore, thine, thine in every joy ;
“ Undimm'd by faults I deep deplore, my nature's dire alloy.
“ Nor think my step can be pursued,—beyond earth's bound doth
 lie ;
“ A gulf surcharg'd with kindred blood ; there severing us for aye.
“ Farewell ! farewell ! I do not say, think on thy perish'd bride,
“ Her form shall bless thee still by day, in dreams shall grace thy
 side.
“ Nor deem 'tis senseless air ye clasp, in those encircling arms ;
“ Her love, defying death's cold grasp, survives these fleeting charms ;
“ 'Twas all her worth, her soul's true dower, her heart's one trem-
 bling plea,
“ Shade of thy nobler nature's power, thro' life 'twill follow thee.
“ Then press once more thy lips to mine—in this sweet, sacred
 spell
“ Receive my parting breath to thine—thus, thus ! O bliss ! Fare-
 well !”

Conclusion.

Years past, but not the gloom of woe from good Russaloo's breast,
Care timeless wrung his youthful brow and marr'd his spirit's rest.

Yet still, from others' bliss deriv'd a solace pure he found,
Which wrecks of youthful hope surviv'd and freshness scatter'd
round.

'Twas when time's softening wing had swept the furrow'd scars of
woe,

And tears in midnight silence wept had ceas'd at length their flow;
That summon'd by the general wail, Russaloo sought the bound
Of Abisara's fertile vale, with mountains girdled round:
For there the Rakuss dire, who fled the hero's conquering brand,
Still haunts the rugged mountain head and wastes th' affrighted
land.

He travers'd swift the selfsame track Pehoon had trod erewhile
Till old Gundgurh tower'd steep and black in morning's golden
smile;

The monster heard that voice of doom and dropt his shuddering prey,
And to his den's deep, cavern'd gloom fled, wing'd with wild dismay.
In vain Russaloo hail'd him back with truceful proffers wooed;
And through the cavern's entrail black his footstep far pursued;
To all but Terror's impulse dead, he deeper grop'd his way!
Russaloo slow retrac'd his tread, back to the light of day;
There in the cavern's jaws of death uphung his dreadful bow,
Secure, the sight would chain beneath man's dire, but dastard foe.

And centuries since have roll'd away and threescore times renew'd
Hath man's sad race by slow decay, the bygone race pursued;
Yet pent within that dungeon hold, the Rakuss dire remains
Where old Pirthan, his forehead bold lifts o'er the subject plains;
And oft' to scape his doom of night will seek the entrance low:
But aw'd and terror struck at sight of good Russaloo's bow,
Back to the darkest gloom retrace his step with hideous roar,
Which rocks the mountain to its base, and quells the affrighted shore.

And good Russaloo's frame is dust and little men alone
Tread where the mighty, wise and just, 'erst built a glorious throne.
Yet stabled in a cavern old on bleak Sirbhunna's crest
Stands, barb'd for fight, his war-steed bold, impatient of his rest;
And near the cave disjected lies, the Valve, with his strong bow

Russaloo's might would easeful price and o'er the entrance throw
 A marble rock of mass immane, with age and lichens grey
 Might foil the strength of fifty men of our degenerate day.
 And still with awe the peasant views that relic ag'd and worn,
 And o'er the hero's might will muse and sigh for his return.

Notes to the Legend of Russaloo.

(1). On Sialkot's embattled steep.

Sialkot one of the most ancient of Forts and cities of the Punjab was founded by Rajah Sala Byne or Salivahanna, father of Russaloo. The Fort, which adjoins the city to westward is a high, oblong mound, with rectangular defences of curtains and round towers, massively built of brick and mortar. Not many Baktro or Indo-Greek coins are found in the ruins. The commonest perhaps is the copper coin of Apollodotos.

Sala Byne of the Pooroowar family of Chundrabunse Rajpootres, flourished in the first century of our era. Sialkot was probably the capital of that Pôros (πωρος) Pooroo, who was surnamed the coward by Alexander's soldiers.

(2). His daily woodcraft done.

The character of Russaloo as preserved by tradition, resembles the model proposed to themselves by Knights of the chivalrous age. Self-denial formed an essential part of the system. All sensual enjoyment was forbidden. His life was spent in the chase when not occupied in war, and it is said that he daily rode from his dwelling at mount Moorut to Dumtour in Huzara to hunt, a distance of eighty miles, returning at night upon his wonderful steed Bhorî Rakhî* to Moorut. A similar tradition exists in Khorasaun relating to Roostum. A sculptured rock is there shown which is said to have been his palace. And from thence to the Furrah Rood and back he is said to have galloped daily to water Rôq his steed. The interval, if I recollect right, being upwards of twenty miles.

* Bhorî Rakhî, black and long-breathed. The steed on which he assailed the Rakuss was a dappled grey.

The superhuman strength of Russaloo is ascribed to his continence. He was a Jutt Rajah, i. e. one practising self-denial and wearing like Samson unmutilated hair. The fall of poor Rani Coqla his second wife, was attributable no doubt to this unamiable self-denial of Russaloo. For tradition says that one day when her beauty melted his heart, he lost this miraculous power and observed with dismay that his arrows no longer had force to rebound back to his hand. The character of Russaloo as preserved by tradition is various, according to the taste of the bards who have handed it down. Some represent him as a pattern of all that is noble and brave in Asiatic estimation. This does not include that gallantry and delicacy toward woman, which with us is essential to the character of a gentleman.

Others describe Russaloo as a savage of miraculous power, but uncouth and destitute of all sympathies proper to the hero. The same diversity of traditions regarding Roostum exists. I have in the foregoing tale preferred the tradition which is most natural and most agreeable to the general reader.

(3). His brow was wreath'd with Nurgis flowers.

From the habit of planting the Narcissus upon tombs and shrines, it has acquired a certain sacredness of character. It is true that the Hindus have few tombs. They have shrines however, many of which have been adopted by the Muhammadans. The Narcissus is common in the Punjaub.

(4). Whose every vital fold

Is fenc'd with Damasc plate of proof which

Prison'd Genii frame

Beneath the cavern'd mountains roof in red

Volcano's flame.

The plate armour of Asia, unlike the complete steel cases of Europe is formed of rectangular plates of steel, braced over the surcoat and covering only the vital parts. Underneath, however, a shirt of mail was generally worn. Much skill is lavished upon the plates which are of cast or damask'd steel arabesqued in gold. Kawf is the prison of the genii. There, in caverns they await the day of judgment—secured by the inviolable signet of Solomon.

(5). From Bruhm, the empire's first dread Lord.

Raja Bruhm is the first on the list of Rajas of Sialkôt. I have never elsewhere met this name applied to a mortal, it being generally used to denote the Almighty.

(6). And every shaft that err'd in flight, rebounded to his side.

See Note No. 2. Such saith tradition was the force of Russaloo's bow and arm, that if a shaft erred in flight it rebounded to his hand. A proof of this wonderful power was exhibited by him on meeting the four Rakuss. They, refusing to believe that so diminutive a being could be the great Russaloo who was to destroy them, set up their Tawas (iron plates upon which bread is baked) four in number, each massive as the round table of King Arthur. Russaloo to convince them, sent a shaft through all four plates.

(7). Till o'er those verdant bowers

Where Ravi leads her current blue rose Oodinugri's towers.

According to the Bard who gave me the best version of this tradition Oodinugr is the old name of Lahor. An old site however called Oodinugr occurs on right bank of the Hydaspes below Jelum. Not being able to visit it in person I sent thither a Moonshi, who made a rough plan of it. By his account it must have been a moderate-sized town. The coins there found, are exclusively Hindi, so that in all probability it was either ruined previous to Alexander's invasion, or founded subsequent to the extinction of the Baktro Greek Dynasty. The latter appears the more reasonable assumption, for I do not think that the Hindoos had a coinage previous to the Macedonian invasion.

The approach to Lahore from the North is singularly fine. The low plain forming the basin of the Ravi is often a lawn of turf—elsewhere it is covered with rich cultivation, from which rise groves of fine trees grouped around white obelisks, built to commemorate the decease of Sikh nobles. Such is the foreground—and beyond it rise the city defences of masonry, surmounted by the still loftier towers of the citadel and the domes and minarets of the chief masjid. All these are the works of the Kings of Delhi.

These walls and towers were of course non-existent in Russaloo's day. But there must have been older works, for Lahor is too much exposed to invasion to have been ever left unfortified. And no

doubt Oodinugr like other Hindoo cities was adorned with many a graceful obelisk.

(8). The peepul glooms alone

Each leaf some restless sprite hath made his own peculiar throne.

The peepul (*Ficus religiosa*) being an aspen, is supposed by Hindoos to be haunted by myriads of evil spirits corresponding in number to the leaves of the tree, the fluttering of which is attributed to their agency.

Therefore, though Hindoos enjoy the deep shade of the peepul by day when the power of those spirits is limited, they dislike sleeping under that tree at night.

(9). And from the fane no tinkling bell announc'd stern Shiv'h's rite.

It is difficult by any arrangement of the letters of our alphabet to give the sound of this name. Shiv'h it is well known is the god of destruction of the present Hindoo creed, i. e. he is the destroying form of the great spirit Bruhm; and by the law of nature, his worship has for many ages, almost superseded that of all other gods of the Hindoo code.

For with the choice of three attributes of the Divine Essence as objects of his adoration, the Hindoo speedily forgot the creator Brahma, and the preserver Vishnoo, to devote himself to the destroyer Shiv'h. In the oldest of Hindoo histories (which however is modern compared with those of Europe) I mean the *Raja Tarangini*, we find mention of innumerable temples dedicated to the god of destruction, but very few to the more beneficent attributes of the Deity, which is proof that the abuse is of several centuries' growth, and not the consequence of the Hindoos' degradation as a conquered people.

The Hindoo is summoned to the worship of Shiv'h by the sounds of the bell and of the conch.

(10). Yon pile of bread might feast for years the Pandoo in his pride.

The Pandoos in India hold the place held by the Cyclops in Sicily. Even the Indo-Greek buildings in Cashmere which date probably from the 1st century of our era, are ascribed to the Pandoos.

(11). A monstrous race. Of gods and men the mix'd and spurious brood.

Such is the Indian notion of the Rakuss, whose approach was preceded by thunder, and who was supposed to have a certain degree of power over the elements. The word giant does not express the nature of the fabulous monster, nor does the Djinn of Arabic fable. For although the Rakuss could at times work a miracle by muttering a charm, his power in this respect was supposed to be limited to the number of charms he might have learnt. He was also subject to violent death. The belief in the former existence of such a monster is very general throughout the Punjab. The bones of elephants occasionally turned up in the soil on the left bank of the Jelum are universally attributed to the Rakuss. A human being formed upon such bones would have been from 24 to 30 feet high. Traditions vary as to the number of the Rakuss. The name of one is remarkable. It is pronounced Terra or Tera, or rather the sound is intermediate. The giant Terra belonged to the Roman not to the Greek mythology, and could scarcely therefore have been transferred to the Punjab. It is Tera who is supposed to be still alive in a cavern of Gundgurrh.

(12). For I am sworn thy lot to share, to bless or die with thee.

The chivalrous spirit of Russaloo belongs to the old and apparently original tradition; to a time when woman held a higher place in society, than at present she holds in India, before in fact, the Muhammadan conquests had introduced their degrading estimate of the sex. As the tradition has reached later years, it has probably been alloyed by the changed spirit of the times. Russaloo is made to commit acts wholly opposed to this noble generosity. The Ballad does not make the woman, for whom Russaloo was about to offer his life, a lady of rank. She is merely a woman, and she is old and in distress; the three most sacred claims upon a generous heart. He at once adopts her in word and deed as his mother.

Natoo rooh my Booddia, hunjoo ra dul kar

Jih rub ruksi tera beté ra, my sir deh-sa char.

Weep not my old woman : there is no call for tears

Since God has placed your son beneath my protection, my head shall be for his.

(13). At noon the Neelrao's silver wave laps'd past them, free and fair.

I have not been able to identify this river, not having been able to visit the spot. It should be Westward of Lahor in the Bari Doaba.

(14). From Mungla's cliff V'dusta's flood cleared at one mighty bound.

Mungla, named after the Mars of the Hindoo, is a castle upon a cliff overhanging the Jelum (V'dusta, Udaspes) and looking down upon the scene of Alexander's triumph over Poros. The Jelum is there very narrow and deep. In the castle is shown the dice board (a slab of stone) on which Raja Sri Kupp used to throw for the heads of his guests.

(15). Dhangulli's vast ravines and rock his footsteps' thunder bore.

Dhangulli, situate on the right bank of the Jelum many miles above Mungla, is a long sandstone rock peninsulated by deep ravines, the site anciently of the palace of Sooltan Sahrung, last of the Gukkur Soltans previous to the division of their principality. Sahrung is celebrated in tradition. His memory is dear to the people, and the reputation of his justice and of his fidelity to his sovereign, the unfortunate Hoomaioon, are still proudly recorded by them. It is said that one day a horseman drew up his steed at the door of the Sooltan's palace, and seeing there a woman said to her, Send Sahrung to me. The woman astonished at the insolence of the stranger ran in to Sahrung, expecting that he would resent it. But Sahrung after a moment's reflection said, This can be the Emperor Hoomaioon alone. He ran out joyfully to receive him, and led him with reverence into his palace. Hoomaioon was in full flight from the armies of Sher Shah, Sahrung gallantly took up his cause. He saved the Emperor, but was himself slain in sight of his own palace. His skin was flayed off, stuffed with chaff and set up on the road side as a warning to others.

After him the Gukkur principality was divided and again subdivided until, its strength sapped by these subdivisions, it was finally conquered by the Sikhs under Raja Goolab Singh and Sirdar Hurri Singh. I had the melancholy gratification of releasing twelve of

the chiefs of this unfortunate family, from the prisons of Maharaja Goolab Singh, almost an equal number having perished there.

(16). Swift through Margulla's strait he shot, Hurrôh purl'd bright and clear.

Margulla or the broken neck is a trifling pass in the tail of the limestone ridge of mountain, westward of Rawulpindi. It has been paved with some care by one of the Emperors, whose favourite wife was detained by the badness of the former road.

Hurrôh is a small river rising in the Dhoond country and joining the Indus below Atuk.

(17.) And rose Heaven's purpled sheen to blot thy splinter'd ridge, Gundgurh.

This is one of the most remarkable mountains in the world. It is a rock of black clay slate capped with blue limestone, about thirty miles in length, and rising to about 4,500 feet above the sea.

It is generally inaccessible on the Eastern face. But three considerable fissures run into the mountain by a gradual ascent until they have climbed about half the entire altitude. The North Eastern corner of the mountain is accessible. Being isolated by valleys and not scarped with precipices on the Western face, Gundgurh might at first view appear easy of conquest. But the fact has been proved to be far otherwise.

Its main strength is undoubtedly the valour of its inhabitants; but this is assisted by local peculiarities. The Northern portion of the mountain is a table, upon which and in the ravines, dwell about 4,000 inhabitants of the Mushwani tribe, one of the bravest races in the world. The remainder of the mountain is a long sharp ridge, of which the spurs only which descend westward toward the Indus are inhabited. The ridge itself is rugged and wholly destitute of soil and of water.

Thus the northern portion, called Srikôt is a natural fortress victualled and garrisoned, and its extent being inconsiderable, the inhabitants can see almost from their dwellings the movements of an enemy beneath, and can muster rapidly at any threatened point to meet the danger.

All the ascents to the mountain are extremely steep and rugged. The mountain is filled with a thorny jungle mixed with scattered

rocks behind which sharp-shooters find secure cover. The deep Indus without a boat is close at hand ; beyond which the inhabitants can retire upon inflated hides, if hard prest. The opposite, i. e. western border of the river, is occupied by warlike, independent tribes, closely allied to those of the mountain. These tribes readily afford asylum to fugitives, and as readily come forward themselves to aid in the defence of Gundgurrh.

A soldier who considers these facts, will not marvel at the fame this mountain has acquired in the Punjaub. It is one of the few points at which Nadir Shah failed, being here signally defeated. And in six battles it maintained fame as a virgin fortress, the last being the more bloody and disastrous defeat, of Hurri Singh, the hero of the Sikhs, at Nara.

(18.) With such a crash, each river flood of five that mightiest roll'd.

Their waves surcharg'd, arrested stood, each o'er her sands of gold.

All the Punjaub rivers yield from their sands gold dust. That of the Indus is of very pale colour, containing perhaps an alloy of silver or of platinum. It is difficult to ascertain the matrix of this gold, owing to the rarity of finding its particles adhering to any of the substances, whether sandstone, quartz or gneiss, amongst the debris of which it occurs. But as some of the smaller streams which rise and terminate in sandstone debris, yield also gold dust, it seems probable that an auriferous sandstone is one at least of the matrices.

(19.) But Aba Sind inviting spread his sheeted silver bright.

Aba Sind, father Sind, the name reverently bestowed upon the Indus by the tribes occupying its banks. Amongst the Hindoos rivers are generally feminine with a few exceptions. Of these Aba Sind was not one, as the following old traditionary lines will attest :—

Peeloo churria Gundgurrh, nuzr kurreh kulloh :

Age bhuggeh Sind Rania, pichchah bhuggeh Hurroh.

Chuch Bunnarr Sumundur ki, jo bheeje so hoh.

Peloo climbed Gundgurrh and stood gazing,

Before him rolled Queen Sind, behind him flowed Hurroh.

Chuch Bunnarr like the ocean, whatever you sow there will spring up.

Here the Sind (Indus) is styled Rania the Queen. Peeloo was a poet and traveller who had roamed the world twelve years on his mother's shoulders. There are many traditionary lines attributed to him, descriptive of Huzara and its neighbourhood, but none I believe are in MS. and few of the bards or peasants are acquainted with more than a few stanzas. They are worthy to be collected, and if not collected now, will soon be lost.

(20.) Where dread Aornos' forests nod, far 'mid the azure sky.

According to Curtius, the Indus washes the roots of Aornos. According to Strabo, it is near the springs of the Indus, i. e. the issue of the Indus from the pathless mountains. Arrian makes Alexander visit the Indus in progress to Aornos.

(21.) And still the tomb his name retains, an islet rock that now
O'er Aba Sinde's pure azure veins, lifts high its castled brow.

I have taken a liberty here with tradition and have made the rock Pehoor the tomb of the Rakuss Pehoon. The names are very similar. The rock has much the appearance of a tomb. But although Pehoon, one of the Rakuss, is said to have been slain near the spot, I have never heard the rock connected with the event. Pehoon was formerly an island. But since the cataclysm of the Indus about fourteen years ago, it is an island only during the swell of the river.

(22.) But Pugrbutt rehearsed a spell.

I am obliged here to follow the tradition.

(23.) And that above her hung suspent carbuncle rich and rare.

The reader will remember the Arabian Tales in which the carbuncle is represented as luminous in darkness. This is supposed to be not wholly fabulous, but it is stated that when excited by friction the carbuncle or oriental garnet emits light.

(24.) "Kuveera dread," she cried.

Koovera one of the lesser deities of the Hindoos, appears to answer to the Plutus of Greek Mythology, or perhaps more nearly to Vulcan as Opifex. He is the god of wealth.

(25.) His guardian saint arose.

The Devarshees are the saints of the Hindoos.

(26.) A pillar'd porch of marble stone, gave access to the shrine.

The Hindoo temple has properly neither porch nor aditus. But in Rajpootana whither Greek art spread from Ariana, the temple of

Shiv'h, an obelisk, has often a porch and sometimes also an aditus both on pillars with convex roofs built by laying successive layers of flat stones of rectangular figure, so that the sides of each successive layer shall cut the corners of that below. The porch and aditus are manifestly foreign to the original design, yet their effect is picturesque and pleasing.

(27.) And as he near'd the mystic light, two globes of dull red fire.

The tradition is silent as to the means by which Russaloo found the maiden, and this verse is supplementary.

He found her and forced her, by the ungallant threat of his drawn sword, to reveal her brother's retreat and the incantation by which he might be brought out of the rock in which he was petrified.

(28). But bent Russaloo's mighty bow.

The eastern bow is seldom slackened. In figure it resembles that with which Cupid is armed, in ancient paintings. It is rarely formed of steel; most generally of wood and horn mixed. The structure is rude and simple, and apparently unequal to the work expected of it. The bowyer takes the first stick of mulberry tree that comes to hand and cuts from it a pair of crooked slips to serve as horns to the bow and a third piece for the handle or grasp. He then cuts a couple of straight slips of buffaloe horn to form the springs. If the horn be crooked, the slips are straightened by means of fire, One of the horns or points of the bow, formed as said of mulberry wood, is then laid upon the spring of buffaloe horn, and they are bound firmly together with a thong of fresh sheep's or goat's gut soaked in glue. This binding is applied in the form of a complete case. When the lashing approaches what is to be the centre of the bow, the grasp of mulberry is applied to the other end of the spring, and bound to it with the gut in like manner as the horn was secured. The same process is repeated for the other side of the bow. After this the irregularities of surface are filled with glue, and a coloured varnish is applied over all.

Marvellous as it may appear, such bows are susceptible of great elasticity and power, and if kept dry will last many a year of wear. Such a bow costs from 1 to 3 rupees: it is very handy for horsemen because so short and light.

This bow was no doubt introduced into India from Scythia by the Moguls—it is manifest that something of the same nature was in use in ancient Greece, for Homer describes the bow of Pandarus* as being formed of the horns of the mountain goat.

Curtius describes the Indian bow as being so long and heavy, as to be necessarily rested upon the earth when being drawn, the arrow also was heavy, perhaps like the Bheel arrow.

(29). On Sialkôt's age-structur'd height and blood-cemented towers.

Tradition says that when Rajah Sala Byne was building the fort of Sialkot, the foundation of the south-east bastion gave way so repeatedly, that he had recourse to a soothsayer, who assured him that it would never stand until the blood of an only son was shed there. Sala Byne upon this took a boy, the only son of his widowed mother, and slew him upon the foundation, which since then has stood fast.

Upon this tradition, the Bards converted to *Islam* have built a tale in honour of their saints, who it is said signally avenged the murder, although it happened several hundred years before the birth of Muhammed, and about a thousand previous to the Muhammedan invasion of India.

(30). The happy breeze from some far land her exil'd koel bears.

The koel is a species of cuckoo of which the male is black, the female brown. Its cry is wild, sometimes mournful, at others mirthful.

(31). The Peeluk long by winter bann'd.

This is a beautiful bird of the size of a thrush, its plumage of the richest yellow. It has a beautiful note like the bulbul's, but of richer tone, it is a bird of passage.

(32). Like pebble bounding o'er the ice, far through the echoing grove.

* *Αντικ' ἐρύλα τοξον ευξοον ιξαλου αιγος*
Αγριου, ον ρα ποτ' αυτος υπο στερνοιο τυχησας,
Πετρης εκβαινοντα δεδεγμενος εν προδοκισι
Βεβληκει προς στηθος Iliad 4, 105.

Which old Chapman translates,—
 He instantly drew forth a bow most admirably made
 Of the antler of a jumping goat, bred in a steep upland
 Which, archer-like (as long before he took his hidden stand
 The evick, skipping from a rock) into the breast he smote
 And head-long felled him from his cliff.

I know of nothing else that can give an idea of the peculiar and most musical note of the crested woodpecker. Its plumage is the most beautiful found in the plains of India.

(33). Aye and anon fresh tumult stirr'd, the feathery choir employ,

As back returns some banish'd bird and loud proclaims her joy.

When camped in the beautiful groves of Rohilkund, I have often stepped out of my tent in haste to see what newly arrived bird was making the woods echo with her note, amid the applause, (so to speak) of all the feathered inhabitants. The variety of singing birds in that district is greater than in any other of India, and I never hear the name of Rohilkund, without in fancy hearing the wild calls of its birds amid the sacred stillness of its groves.

(34). Softly the corn its emerald waves heaves to the breath of morn,

Each islet grove and castle laves each gnarl'd and antique thorn.

The seas of rich cultivation in the Sialkot district are broken here and there by some dark grove or solitary tree or half ruined fort, entirely isolated by the green expanse which undulates around them to every passing breeze.

(35). And on the fretted roof display the marbles chaste and rare,
With ruddy gold of rich inlay, in happiest contrast there.

The white roofs of marble ornamented with gilding are amongst the most elegant decorations of eastern architecture. Although I have introduced them in the age of Rajah Russaloo, it is probable that they were not known in India, previous to the Muhammedan invasion.

Whilst yet the Sikh Government ruled in the Punjaub, I stayed a day and night at the castle of Sialkot in a chamber built for the service of the Muharajah Runjeet Singh. The walls were impanelled with frescoe paintings of scenes from Hindu and Persian fable, and notwithstanding many defects, were in the highest style of Hindu art, and very superior to the generality of their productions.

The Sikhs were barbarous compared to the Moguls, whose elegant designs and rich and graceful details are still the wonder of the world. I do not therefore mention this chamber as a specimen of eastern architecture, but because it suggested the passage of my text.

(36). And tissues bright from lands unknown, like golden fountains flow.

Golden tissues are matter of history with us, but still form indispensable articles of luxury in India. They are often very beautiful, being formed of a silken web and a golden woof. For this fabric the silver thread wound around silk employed for ordinary gold lace is not used: but the flattened wire of gold or of silver.

• (37). But aw'd and terrified at sight of good Russaloo's bow
Back to the darkest gloom retrace his step with hideous roar,
Which rocks the mountain to its base, and thrills th' affrighted shore.

It is a very remarkable circumstance that until within the last fifteen or twenty years, the mountain of Gundgurb used at intervals to utter, or seem to utter, a roar as of distant thunder. Numbers of persons are living, who testify to have heard this sound even to the distance of sixty miles from the mountain. They say that it was distinguishable from thunder and from all other sound, and not attended ordinarily with any tremor of the earth. Yet the mountain which is a peak of blue mountain limestone jutting through a long ridge of black clay-slate permeated with veins of white quartz and sulphate of lime, shows no trace of volcanic agency. The emperor Jehangeer mentions this bellowing of the mountain, which he calls Gurj Gurb, or the house of thunder, and doubtless Gundgurb or the naked house is a corruption of this. The sound is universally ascribed to the imprisoned Rakuss, who utters it every time he retreats from the sight of Russaloo's bow.

I account for this sound and its sudden cessation in the following manner—Gundgurb is the last mountain of the long deep trough of the Indus. Sounds uttered in narrow passes of that trough are multiplied like the human voice in a speaking trumpet. The last wave of sound is reflected from Gundgurb, the last mountain of the chain. It seems to people of the plain to be the utterance of the mountain itself.

About 150 miles above Gundgurb, the Indus cleaves the snowy Caucasus, being scarped on either hand by gigantic cliffs—large masses of these cliffs plunging into the deep stream created a wave of sound which was borne onward by the conducting agency of the mountains on either hand, and eventually came to the plains reflect-

ed from Gundgurh. But about A. D. 1839, an enormous mass of the overhanging cliff fell into the river channel, so as to dam up the river for months; until the overflow of the accumulated waters brought down the dam and deluged the entire valley, carrying away alike the rock, the forest and the very soil. The fall of this mass was either the work or the cause of an earthquake which was felt to the distance of 150 or more miles.

It is easy to suppose that such a fall would bear with it all the crumbling masses of the cliff, and leave a clear and solid scarp which, for many years, would not shed any considerable mass into the river.

The following is the legend precisely as I took it from the lips of a minstrel, when shut in by the snow in a ricketty and dark bastion of one of the rude castles of the Dhoond mountains.

Recitation.

Rajah Russaloo son of Rajah Sala Byne was sleeping in his tent in the castle of Sialkot when the Punjpeer* appeared to him in a vision and said "Go thou and slay the Rakuss," so the Rajah went to Ooda Nigr and alighted at the abode of an ancient woman. She was cooking bread, but the whole of her mohulla (ward) was desolate, and sometimes she wept and sometimes she sang. And in that city the inhabitants sent daily a buffaloe, loaded with bread and a human victim to the Rakuss as his rations, otherwise he would have destroyed the city. And the Rakuss dwelt in the Barrh or wilderness west of the city; and the Rajah address the woman, thus:

(Chaunted to music.)

Oochchek mundul mata marria do russ killah bazáar,

Kye ra sub dur disn sukna kavur lisseh sunsar

Natoo rooh my booddiah, hunjoo na dul karr,

Jie rub rukh si terá bétéra my sír deh sa char.

She replies.

Sut bété Raja Jee, my jahch, kye n'h keeta kahj,

Aikulla betá rehguya, oosdi bárí† ahj,

* Five Muhammedan saints: Bhawulnug of Mooltan, Shah Rooka Aulum Huzrut, Shah Shumse, Mukdoom i Jehánia Jehangusht and Baba Sheikh Furud Shuk'r Gunj.

† Bari is a peculiar word, denoting the lot of a sheep or other animals for slaughter.

Neela ghorawallah shuksa, too moohndári sir pug,
Jereh zalum soohj deh aah ! phiraini uj.

Then on the morrow, Russaloo departed in company with the old woman's only remaining son, who was mounted on a pony, and who drove a buffaloe laden with bread. And they reached the Neel Rao river, and Russaloo stripped to bathe. And the sound of thunder was heard in the clear vault of heaven, and fear fell upon Russaloo and the child. And from the forest appeared a column of cloud stalking forward to the spot, and lightnings and thunders proceeded from it. And it paused at the river brink, and an arm huge as a palm-tree was stretched forth with its mighty hand to seize the youth. But Russaloo drew his sword and severed the hand from the arm. And the Rakuss uttered a dreadful roar and fled, and his brothers and sister came to see what was the matter—and as they met their bleeding brother, they saw Russaloo with his naked sword, and fear fell upon them because of a prophecy, which said that the son of Sal Byne should destroy them, and one of them said to Russaloo—

Kahan toomhari vutn hy, quon nugri shihr, graon ?

Kis Rajah ka too bété ra, k'a toomhara nam ?

To which Russaloo answers—

Huz'rut Sialkot ma wutn, woohi nugri shihr, graon,

Sala Byn da my bété ra, Russaloo mera nam.

The answer causes great dismay, nevertheless one of the brothers advances to the combat, but is slain by one of Russaloo's fatal arrows ; and another, Pehoon, is wounded and flies to Gundgurrh. Pugrputt also flies, but being hotly pursued, utters a spell and is instantly enclosed in solid rock.

And Russaloo saw in a dream that the Rakussnie Bééra was concealed in the forest, and he came upon her with a drawn sword, and compelled her to teach him the spell by which Pugrputt her brother might be drawn from the rock. And Russaloo muttered the spell, and thunders pealed and Pugrputt came forth, and Russaloo slew him with an arrow.

And Bééra said to Russaloo, Behold I am beautiful, make me thy wife. And Russaloo consented, and as they walked with infolding arms around the caldron of boiling oil (a nuptial ceremony of those

days), the Rakussnie who was very strong tried to hurl Russaloo into the caldron, but failed. And Russaloo hurled her in and cut off her head.

And he mounted and rode to Gundgurrh, whither the first Rakuss had fled. And the Rakuss Tera, burrowed in a cavern of Mt. Pîr Than. And when Russaloo found that he could not get him forth he hung his terrible bow of steel in the cavern's mouth. And whenever the Rakuss would come forth, the sight of this bow sends him back howling to his retreat. And many who are living have heard his voice, and I amongst others: it is like distant thunder. But the last twenty years, it has almost, if not wholly, ceased.

And many other acts were performed by Russaloo contained in other traditions and songs, and the steed of Russaloo still stands caparisoned in a cavern at the summit of mount Sirbonn, waiting for his master.

Some bards add the following preface to the legend, which is curious in many respects. It shows the succession of the Jusrut to the Pandoo rule, and the employment by the bards of strings of metrical aphorisms, no way connected with the tale, as introductions to their ballads.

Ulla dehware. Uvl bóoti Pándoon, pbeer booti Jusrut,
 "Mairi mairi kur gyée," toor kisi nuggeh hut,
 Sumbhul ki, to buddia kia? Kooah jis ki mooshk nhvass,
 Gidr ko, to, sut nhve, jis da nhkul, nh mahss,
 Puttr ko to pálá kia? Khoosré ko kur wass?
 Undé ko chanoon kia? toorreh deveh bullun punjahss
 Moorook manoo admi hust mooeeka (wuh) mahss
 Sussoo bahj nh sahoreh, huldi bahj nh mahss,
 Bahj subooneh, khupra, trieh t'hohk n'h rahss.
 Uk n'h kurrieh dundna, sup n'h khyeh mahss.
 Narr nh kurrieh lahdleh, nh hassoh kurreh bunahss.
 Jummeh si, to, sut guz, bur jo bun guz to charr,
 Piu, pootre, mojah lehguaya do-no aik sh' narr
 Koloo koot'rr lehguaya, chukki lehguaya khán
 Taili káti ninglia, chowrasi hurff graon.

Russaloo thus addresses the ancient Dame, whom he finds in the desolate city.

Oochchekh mundul mâtá mariáh, do russ killah bázaar,
 Kye ra sub dur disn sukna, k'a vur lisseh sunsar
 Natoo rôoh my Booddiah, hunjoo na dul kar,
 Jie rub ruksi téra bétéra my sir deh-sa char.

She replies—

Sut bété Rajah jee, my jahch, kye n'h keeta kahj
 Aikulla beta hoon rehguja ossdi bari ahj,
 Neela ghorawala, shuksa, too moohndári sir pug
 Jereh zálum sooj deh aah! pheeraini uj.

I cannot answer for more than the general accuracy of the following translation, for the tradition not being written, it is difficult to catch the precise sound of the words as uttered in recital, and the bards become puzzled and bewildered if asked to explain their meaning. Several of the words, none of those whom I consulted, could translate: it is probable therefore that they were mispronounced in recital.

First were the Pandoos; after them the Jusrut.
 (Each said "the world) is made mine own." Yet none remains to
 either of you.

What harm is there in arsenic, or the well* whose odour is rotten?
 Spare to beat the jackal, that hath nor hide, nor flesh.

What careth the rock for frost? The eunuch for matrimony?
 To the blind what profiteth the lamp, tho' you should light fifty?
 Man is an ignorant compound of hair and flesh.

The mother-in-law† without her son-in-law, meat without huldi,
 Clothes without soap.—These three things are amiss.

Bring not the swallow-wort to your teeth. Eat not the flesh of snakes.
 Weep not despondently, nor laugh overmuch,

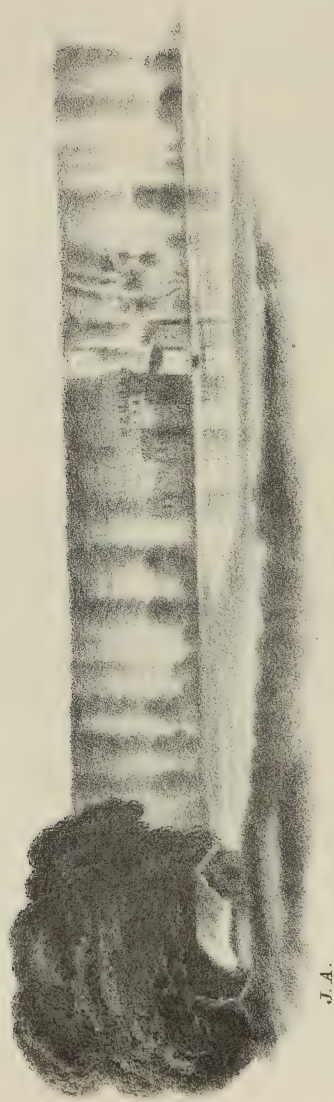
Born an infant of seven ells, would you grow into a man of four?
 The father hath entered his son's boots, one measure serves for both,
 The dog hath run off with the sugar press, the khán hath seized the
 milstone

The worm hath eaten the saddle of the village of 84 figures‡ (in
 letters).

* Some translate Kooah. Stomach.

† Alluding to the custom of treating the mother-in-law with marked tenderness and reverence.

‡ Meaning perhaps, grandiloquent name.



Common usage of India

Russaloo addresses the old woman.

Lofty mansions, mother mine, on either hand, fort and bazaar,
No living thing salutes mine eye. What hath caused this desolation?

Weep not old woman. For tears there is no need.

Since God hath placed your son (under my protection) I will give
my head for his.

She answers—

Seven sons, O Rajah, were born to me. None had wedlock known,*
One only son the rest survives,—To-day his death lot's drawn.
O! Rider of the dappled grey, thou bearded, turban'd man,
The worker of this cruel wrong, returneth here to-day.

Another of these traditionary ballads opens with the following
exquisite address to the Popeeia, which however has no relation to
the tale.

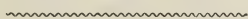
Sawun, Sawun, too kahoh, pee, kurunta pee;

Tainko Sawun k'a kurréh, jin ghur n'h byl n'h bee?

Harvest, harvest, dost thou sing Popeeia peeia pee?

What, thou who hast nor ox nor seed, shall harvest do for thee?

The Popeeia's note is a repetition of its own name running from
the lowest to the highest scale.



On the Mirage of India.—By Major JAMES ABBOTT.

Few have traversed the plains of central India without being struck
by the appearance of distant cliffs—sometimes also of towns and
forests, seen shortly after the rising of the sun, but which they have
vainly looked for later in the day. I first observed this phenomenon
in October 1829, when marching with my company from Kurnaul to
Mhow in Malwa. Several times on reaching camp, I found it pitched
in a plain, walled apparently to westward by lofty (See Pl. VI.) cliffs
which had an inviting aspect. Several times I promised myself
that in the afternoon I would pay those cliffs a visit. But, when-
ever I would accomplish this design, I found that the cliffs had

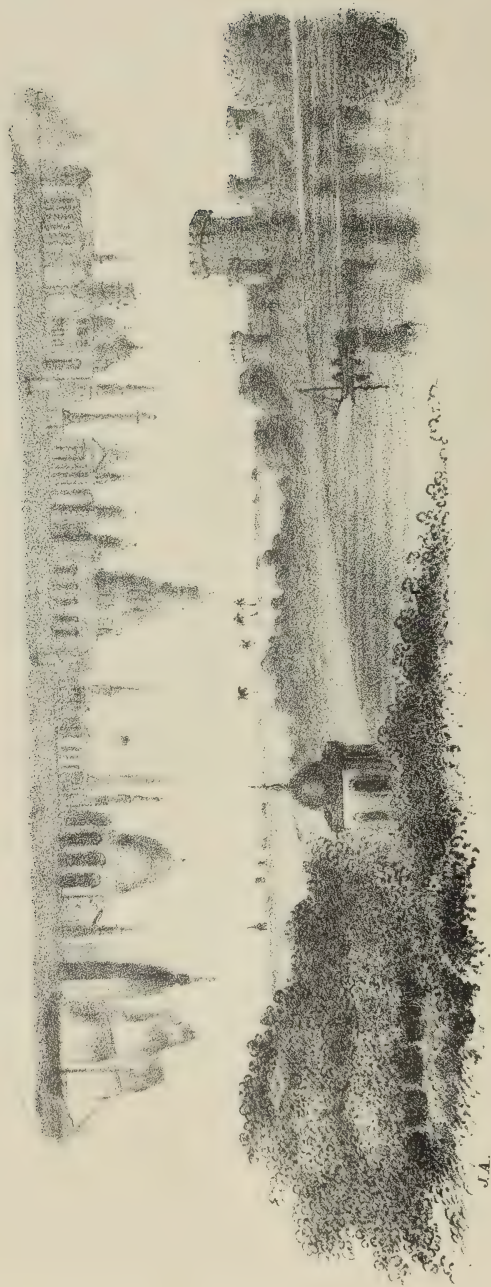
* This again alludes to the Hindi custom of showing extraordinary affection
and attention to a mother-in-law. So that the son literally leaves father and
mother and enters his wife's house. The widow here was peculiarly blest in her
sons, because none of them had thus left her.

entirely disappeared, and I questioned whether I had not been suffering some illusion of the eye or mind : for I was not then aware that Mirage is known in India. A residence in Malwa, where it is common, made me familiar with some of its phases, and as I have never met with an intelligible description of the process of this illusion, a slight sketch may be acceptable to the general reader.

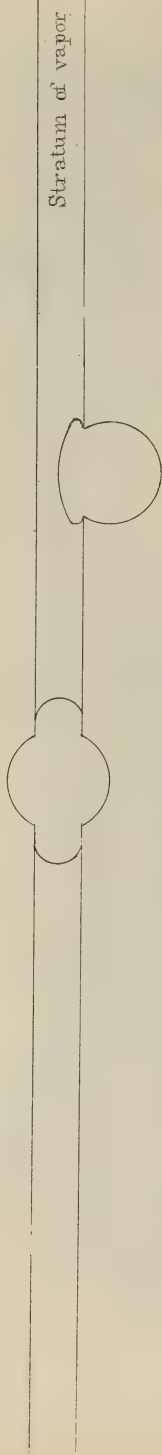
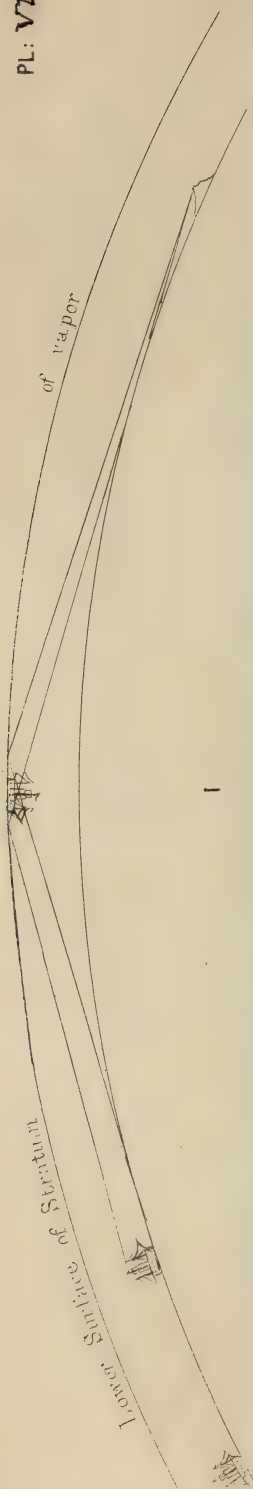
The Mirage most commonly observed in India is the effect produced upon distant objects, by means of a mirror, suspended with its surface downwards at the distance of from 60 to 250 feet from the earth, half way between the object and the eye of the spectator. This mirror is a stratum of dense but transparent and scarcely visible vapor, evolved from the dewy earth by the action of the sun's rays, generally about an hour or two hours after sunrise. The refractive power of this vapor being greater than that of the atmosphere, acts precisely as would a mirror of glass similarly suspended : that is, it catches the reflection of distant objects and exhibits them hanging in reverse. But, being slightly agitated by the air and by the action of the sun upon its upper surface, it slightly confuses every outline ; giving a wavy appearance, as we see in images reflected by a running stream. And as the reflected image is seen in juxtaposition with the substance : and as the stratum of vapor is connected with the earth, by less dense currents rising up to join it, it follows that the lower portion of the reflection is prolonged downwards until it meets the summit of the substance. The substance and its reflection are thus blended together at their respective summits : a respect in which Mirage differs from the reflections in a clear lake. The object and its reflection in the latter meeting together at their bases respectively.

I have described the stratum of reflecting vapor as hanging midway between the object and the spectator ; because this its position is essential to the production of Mirage. But generally the vapor hangs in one continued canopy from the object to the eye of the spectator.

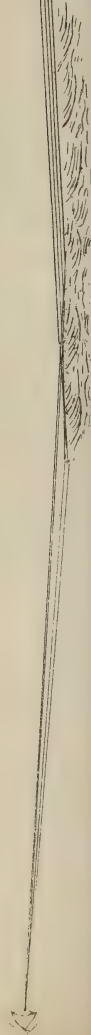
This reflecting canopy exhibits the images of distant objects alone, because its substance is not sufficiently dense to repel those rays of light which fall upon it at any sensible angle of incidence. It is only when the angle of incidence is extremely small, that the ray will rebound from the surface of the vapor. It follows that supposing the strength of illumination sufficient, the image will be distinct in proportion to the distance of the object.



Mirage of a city hidden in the convexity of the Earth.



Rays of illumination



The ordinary Mirage of India occurs at distances of from three to eight miles. But from the foregoing observations, it must be manifest that the effect may be produced at distances so remote, as that the substance is completely hidden in the convexity of the earth, and only the reflected image is seen suspended in the air. Of such an effect the Fata Morgana are an instance. And the pictures of coming vessels hanging in the clouds, as seen from the Isle of France, are another. See Pl. VII. and Pl. VIII. fig. 1st.

In order to witness the Mirage, it is necessary, I believe, that the back of the spectator be turned upon the sun, otherwise the light reflected from objects in the landscape, will not be sufficiently strong to reach the eye after a second reflection from the canopy of vapor.

It is impossible to give any adequate idea of the appearances exhibited by the Mirage, without the aid of colours. In India the most general appearance is that of a long range of cliffs standing to westward of the spectator. These cliffs are of so substantial an appearance so marked with rents and fissures, so tufted with bushes, shrubs and lichens; so clear and distinct of outline, that it is scarcely possible for an unpractised eye to doubt their reality.

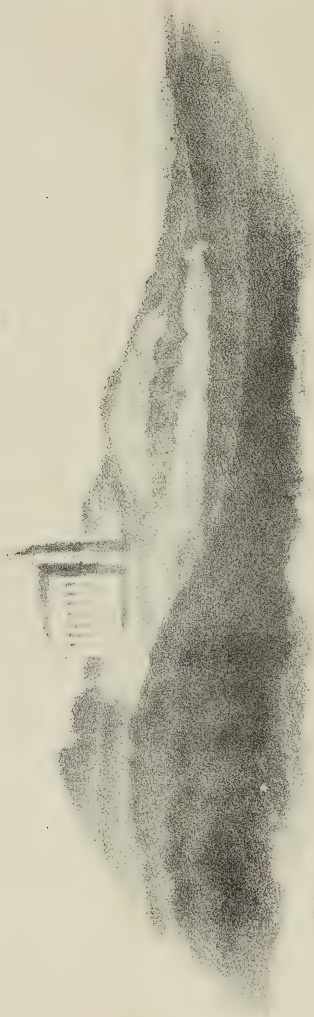
The effect seems to be produced thus. The mass of the vapor being transparent, reflects objects not only from its lower surface, but throughout its substance. Where the reflections terminate, near the upper surface of the stratum, a succession of terminations in a horizontal line give the appearance of a horizontal ledge or table from which hang reversed the reflections of all the images in the landscape, most strongly delineated above (i. e. near this ledge) and decreasing in distinctness downward. Just before their termination, they are met by the summits of the objects themselves, and together they form a faithful representation of the shadows and stains exhibited by cliffs. Trees are the objects most commonly pictured by the Mirage; the darkness of their hue enabling them to be seen at long distances. These when large, form gigantic columns of dark shadow, melting wavily into the substances of which they are the reflections. But sometimes the monotonous aspect of the cliff is diversified and enlivened by the presence of a white town or of moving objects. Every stump of a tree becomes a palm or a column. Every little bush becomes a tall mass of foliage. The imaginary cliffs are clothed with the richest

verdure, stolen from green corn fields drawn up aloft as by enchantment to garnish the fairy structure. Small, white, moving figures, otherwise scarcely noticed by the eye, become stalking ghosts whose heads are lost in ether. Villages far buried beneath the convexity of the earth's surface are seen hanging reversed in the air, and should any small river with its boats be flowing there, all the shifting scenery would be presented in the clouds : the white sails, greatly magnified, and distorted, having a truly spectral appearance, as they hover silently by.

With respect to the Mirage of the Isle of France, the vapor hanging over the sea is probably more transparent and of higher elevation than that which overhangs the land. In this case the sails of a vessel brightly illuminated by the sun, might be seen at the distance of a hundred or more miles. If at a hundred miles, then the reflecting canopy must be distant fifty miles from the spectator's eye. The canopy is not a perfect plane, but is a mirror slightly concave answering to the convexity of the earth. The image therefore would probably be magnified in the concave mirror which would somewhat balance the loss of size sustained in transit from so great a distance. The vapor is not visible excepting by its effects. Visible vapor does not reflect a perfect image of any object. The same difference seems to exist between visible and invisible vapor as between snow and ice. The first is opaque and unpolished, the latter polished and transparent. And the proper distinction perhaps were to call the first mist, the latter vapor.

I one morning in November observed the sun rise through a mirage vapour. As the upper limb reached the stratum, it was drawn up from its convexity, was straitened and distorted. When the vapour cut the centre it presented the appearance delineated in Plate VIII. fig. 2nd. Yet the brilliance of the disc was little impaired in the centre.

Owing to the necessity of a clear substratum of atmosphere, it is seldom that mirage can be exhibited over a large city. But when once acquainted with its laws and phenomena, it were easy to imagine the glorious apparition which such a city as London would present reflected in mirage. If seen from a considerable distance, the whole city would seem inverted and suspended from the clouds. The spires and domes and towers would be drawn downward toward the earth.



J.A.

Mhow Church in mirage from memory.

The moving population magnified to giant dimensions and deprived of all distinctness of outline would appear like a dense mass of spectres called from the antipodes or from Hades. The Thames would streak the clouds with its pitchy waters and the ghost-like array of ships would glide aloft among the clouds throwing down from their sails long wavy columns of light, terminating on the earth.

The effect of mirage is greatly enhanced by the use of a telescope which without unravelling the mystery, brings nearer the objects, each in its proper hue, and greatly increases the beauty of the exhibition.

I have hitherto spoken of the most common species of mirage, viz. that which is produced by a reflecting stratum of vapour suspended overhead. But I have witnessed another variety, viz. that in which the reflecting surface lies below the object and the spectator's eye. This can be seen only where inequalities of surface occur. I first observed it at the military station of Mhow in Malwa. In riding home at midday in the month of March, when approaching the cantonment from the southern heights, I saw the church vividly reflected from a wavy vapour, hanging over the lower ground: the church itself standing on an eminence. The effect was precisely that produced by water upon objects standing beyond it, excepting that the strong undules of the vapour did not much disturb the accuracy of the reflection. I have since observed the same effect elsewhere, but not in so remarkable a degree, see Pl. X.

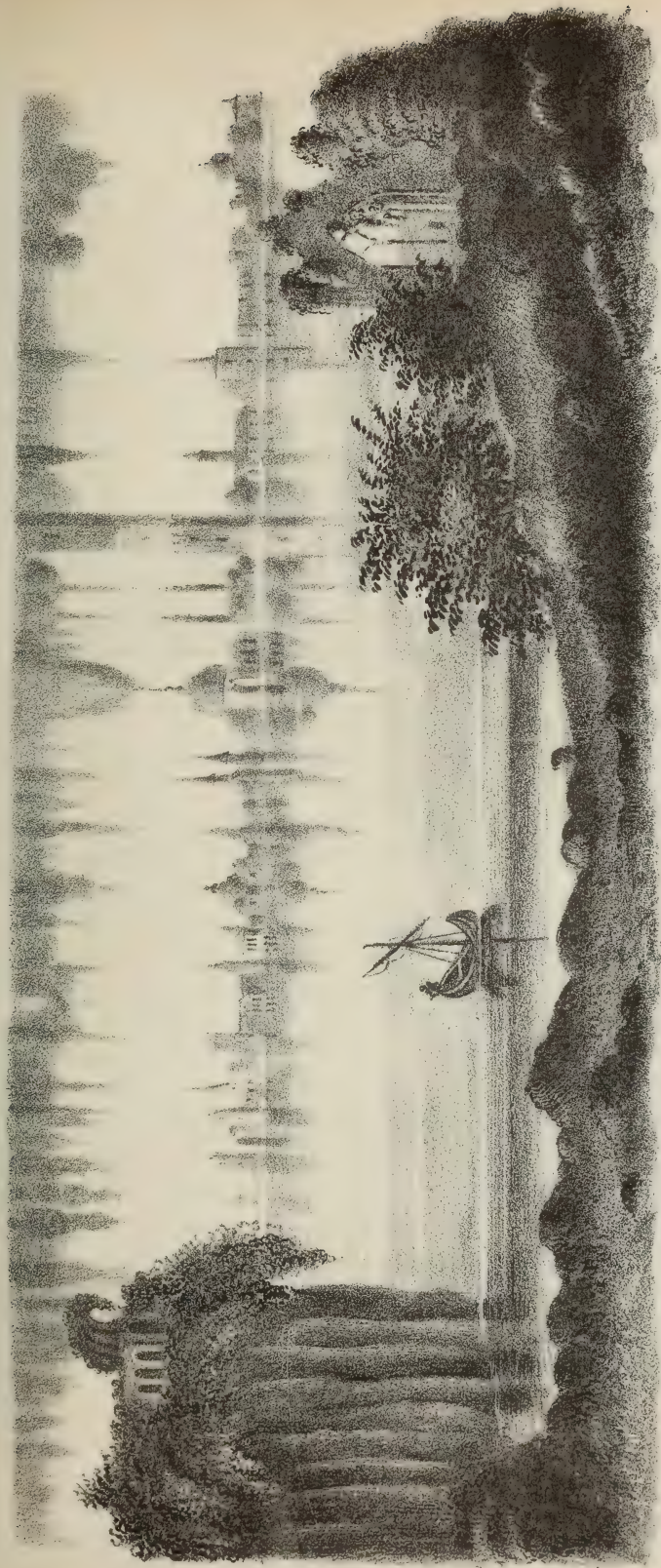
I have also observed upon the Nurbudda and other large rivers that, whereas the nearer current is too rapid and turbid to reflect the rocks upon its banks, the more distant current, equally rapid and equally turbid, presents a perfect reflection of the banks without any waving of outline. This may be attributable to the transparent vapour, ever hanging over streams, acting as a mirror to reflect surrounding objects. Or it may be, that the illuminating rays falling upon the ripples at a very small angle and meeting several successive summits in almost the same line, pursue their onward course almost as from a plane, instead of being dispersed or thrown back by the irregularities of surface. Thus, if the angle of their incidence be of 10 degrees, one or two rays, insufficient to impress the retina of the eye, may be all that reach the organ of vision; the rest being dispersed on all sides. But if the angle of incidence be of one degree, one ray will

meet the eye from one ripple, another from another ripple, with no appreciable difference, and the aggregate will suffice to paint an image upon the retina, see Pl. VIII. fig. 3.

There are other effects of vapour less known than those above described. One of these, is to magnify greatly any object seen through the medium. This may sometimes be affected by scattering and disordering the image: but is, I think, more generally a mere illusion occasioned by exhibiting the figure with a faintness of outline as if seen at remote distance, without any diminution of apparent bulk. Thus, in crossing the desert on my approach to the Bolaun pass, I saw by moonlight a camel magnified to gigantic dimensions: an effect, which I am inclined to attribute to the figure being dimmed by mist, so as to appear remote, when it was really close to the eye and subtending of course a considerable angle. The soft fall of the camel's foot upon sand creates no sound and adds greatly to the effect.

An illusion of the same character I have elsewhere seen beautifully exhibited, viz.: upon the highest summit of the Simla mountain. There, as I have sat gazing upon the glorious landscape, it has been gradually removed to immeasurable distance by a transparent and imperceptible vapour, which crept up from the valley over the mountain brow; and which as it gradually rolled past, as gradually brought back objects to their original proximity, with an effect truly magical.

That species of mirage so often described by travellers of the desert I have not mentioned, because I have not met with it under circumstances favourable to an examination of the phenomenon. I allude to the appearance of water in spots utterly dry, an illusion to which even the most experienced are at times liable; so perfect is the resemblance. This mirage appears to be an isolated stratum of almost transparent but dense vapour occupying accidental hollows, depressed beneath the observer's eye. It is commonest at night in India. The vapour thus accumulated having a higher refractive power than the atmosphere, not only has the gleam common to water, but reflects images of objects beyond it, precisely after the fashion of standing pools. It appears to be commonest in saline deserts, where the extreme heat evolving particles of salt in solution with the vapour, forms a vapoury stratum of greater density than that arising from pure water, and of course of higher refractive power. The effect exhibited in



A Lake-city as it might appear in Mirage.

pl. IX. is of this character; the reflecting medium lying below the object and the spectator's eye. But in the case of the Mhow church, the phenomenon is aided by an elevation of the object above the intervening surface of the earth.

Thus far had I written in Huzara, where I had no opportunity of reference to books. Since my arrival in Calcutta I have referred to Brewster's treatise on mirage. He seems there to attribute the kind first noted by me to the reflection of the image from a denser stratum of *atmosphere*; although he is treating of observations made at sea. This is I think a mistake. The reflection of the sun's rays from the surface of the ocean can scarcely be sufficient to heat the atmosphere in contact to such a degree as to cause a perceptible deficiency in its density below that of the incumbent strata: and, were it so, the stratum thus rarified would immediately ascend. It is undoubtedly a stratum of vapour which forms the mirror, and its presence in that position is thus to be accounted for.—

At night, the mist, parting with its caloric, becomes specifically heavier than the atmosphere, and settles on the earth. There on clear nights the radiation of the caloric from the mist to the vault of heaven, precipitates it in dew upon the earth. Again when the sun rises, the earth's surface imbibes the rays and the dew is evolved in vapour which at first is transparent.

This vapour being of rather less specific gravity than the lowest stratum of air, rises above it, until it meets with a stratum somewhat elevated, which the reflected heat from the earth's surface has not tempered. To this stratum it parts with a portion of its caloric until its rarity is so much abated that it cannot ascend higher; and it then hangs like a canopy in the air, continually increasing by additions of vapour from beneath, but as continually decreased by the escape of particles above. Accordingly the phenomenon is only or chiefly observable from the 1st to the 2nd or 3rd hour after sunrise and when the nights are rather chilly and the skies clear.

Brewster mentions the reflected image (in the atmosphere) of a ship and of the ship's shadow or image in the water. This I presume could be exhibited only from long distances and when the illumination is very strong. I have never observed it.

On NEPAULITE ; a New Mineral from the neighbourhood of Kathmandoo.—By HENRY PIDDINGTON ; Curator Museum Economic Geology.

In my report for February, I mentioned that General Jung Bahadoor had sent us a large collection of ninety-six kinds of rocks and ores. Amongst these, several required careful examination and that more than once repeated, that nothing, even in minute traces, might be overlooked from a country so little known to us.

The greater part however proved valueless, but I announced that there was *certainly* one new mineral, but was unwilling then, as it had been sent to us in the smelted state, to say what it contained, as I was in hopes of obtaining proper specimens of the ore.

The history of this mineral as described by Major Ramsay is, that it had been found in considerable quantities not far from Kathmandoo ; and that the Nepaulese, thinking no doubt from its resemblance to some varieties of Magnetic Iron ore, (though it is not magnetic,) that it was iron, set about to smelt and cast it into cannon balls, which they could easily do as it is very fusible ; but then, when the cannon balls were fired they flew all to pieces ! to the great surprise and discomfiture of the smelters no doubt.

At my earnest request, Major Ramsay procured for me a quantity of the ore, which was sent down to us, but on examination this lot proved to be merely the rubbish of the mine ! with only here and there bits in which specks, and minute nests, and thin veins of the true ore were to be seen ; some useless lumps of pyrites forming the bulk of the parcel ! All this was evidently a trick of the minister's people to mislead us, as their metallurgical skill would be brought into disrepute if the Feringis found any thing extraordinary in this new, and to them strange ore.*

I explained this to Major Ramsay, and he has kindly obtained and sent down to us, from the minister himself, several parcels of the ore in its matrix, in which I have also found two other products

* The presence of cerium makes it a new ore, but its appearance and streak at once shewed that it was a bismuth or antimonial copper, and thus not *strange* to us, though evidently peculiar.

of this singular mine, which I shall afterwards describe; though I do not think we have yet got the largest sized veins or masses of the ore, or all the products of the mine; for I have one specimen of blue copper ore, which, as well as the green carbonate, is traced in some of the specimens.

I now proceed to describe the ore itself and its analysis.

EXAMINATION OF NEPAULITE.

Description.

1. *External Characters.*—The matrix of the ore should be first described. It is principally quartz of all varieties, from the clearest translucent, to the dullest granular and milky kinds; but all are beautifully stained with the fine turquoise blue of the copper which the ore contains; and the matrix is again varied by nests and plates and even layers of another bright fawn-red ore, which here and there looks like a pale red sandstone or iron ore, but which is a silicate of Cerium and Iron (Cerite?) so that altogether it forms one of the most beautiful and showy of mineral ores, and will, I doubt not, be highly prized amongst collectors. Sometimes the red ore is absent, but the siliceous matrix is almost always stained with some shade of blue, and at times has minute mamillated crystals of the pure Azurite (blue carbonate of Copper) on its surface. Here and there chlorite and talcose schists, and felspar appear, but not in any quantity, though the mine is probably situated in a formation of one or both of these rocks. In picking carefully over every fragment of the rubbish, which I never fail to examine closely, I found a small portion of a third ore also, an ore of Cerium (Allanite?) which will be described in its place: I return now to the Nepaulite.

The ore is massive without the remotest trace of crystallisation.* It occurs in veins, mostly in quartz, from six-eighths to one-eighth of an inch in thickness, or smaller; we have indeed but one piece of the thicker kind, and though the thin veins are tolerably pure, the thicker ones have almost all mixtures of imbedded, or veinous, or granular quartz, so that it is very difficult to procure a pure bit

* The fused ore shows at times some of the hackly, semi-crystallised fracture of bismuth; though it is mostly granular; but it is of a pure silvery white colour; rarely showing any approach to the yellow white of bismuth, but sometimes is a little brassy from the copper.

of it for taking its specific gravity: the quartz matrix too is excessively adherent.

In external appearance it resembles exceedingly some of the varieties of granular and massive plumbago, or antimonial ores, which, at a first glance, and where the quartz matrix has no blue stain, it might well be mistaken for.

The fresh fracture is of course somewhat brighter and more steely than the old surface, which like that of the plumbago ores is of a duller black, though always with a good metallic glance; and is small grained, somewhat inclining to hackly, and even at times slightly foliating.

The fragments are of all shapes.

It is completely opaque.

The streak is a dull black, with here and there a bright metallic glance and altogether that of the inferior graphites.

It does not soil or mark.

Its hardness in the perfectly pure specimens; for quartz is, as before said, so very frequently present, that care must always be taken, is 5—6; apparently depending upon the silica found in the specimens; yielding a little, but not very easily, to the knife, by which it may be scraped smooth, but not cut.

It is easily frangible, and rather brittle, but the latter portions even of the pure mineral, are somewhat difficult to pulverize. The powder is of a dull grey black, slightly glittering in the sunlight: It is not magnetic.

Its Specific Gravity, carefully taken from a nearly pure specimen is 4.50. at Temp. 80°.

The Specific Gravity of the fragments of the cannon balls sent us from Nepaul, and which had been of course fused, is 8.1.

Chemical Examination.

Before the blowpipe, it fuses easily and spreads out, the Bismuth however does not separate from it, to form the usual deposit on the charcoal, but when the fused mass is highly heated a slight sublimate is seen to rise.

In the open and closed tubes, no sublimate is obtained even at the melting point of the glass.

When the pulverised mineral is heated in an iron capsule, it be-

gins to give off the white fumes of Bismuth about the low red heat of the iron ; and at the cherry-red heat, it begins to aggregate before running ; but it would seem that all the Bismuth is not driven off ; as it is found also, as well as the Cerium, and of course the iron, in the fused mineral.

In ascertaining its component parts, extreme care was taken to pick minute fragments which were again carefully examined by the magnifier in order to exclude as completely as possible, all mixture of the siliceous and Cerium matrices.

It dissolves in all the mineral acids, and always with considerable effervescence, like a perfect carbonate, which it is. The nitro-muriatic acid was however found to be preferable for analysis, as the bismuth can be almost wholly separated by the first operation.

It was found to contain in 100 parts.

	<i>Metallic about</i>			
Sulphur,	1.	60.		
Silex,	3.	60.		
Carbonate of Protoxide of Bismuth,	34.	80.	24.	6.
Carbonate of Copper,	22.	96.	14.	40.
Per-Carbonate of Iron,.....	25.	62.	9.	21.
Ox: Cerium,	9.	40.		
Lanthanum ?	2.	80.		
	<hr/>			
	100.	78.		

I also found, both *via humida* and by amalgamation, that the ore contains a minute portion of silver, but in too insignificant a quantity to make it of any importance.

It follows, then, that we have here an entirely new mineral of Bismuth, Copper, and Iron, with Cerium and Lanthanum,* and it will be recollected, by those conversant with mineralogy, that the Bismuth copper (or cupreous bismuth) ores, are all in the state of sulphurets, and not of carbonates, amongst which there is nothing which approaches to this compound : in which again the Cerium is certainly not a fortuitous addition, but a part of the pure ore ; and we have thus a full right to claim it as a new Indian mineral. I have therefore called it, from the country of its origin NEPAULITE.

* I have for the present called this product Lanthanum, but am not perfectly satisfied that it is so.

Bibliographical Notice.

Histoire de la vie de Hiouen Thsang et de ses voyages dans l'Inde, depuis l'an 629 jusqu'en 645, par Hoeï li et Yen-thsong ; suivi de documents et d'éclaircissements géographiques tirés de la relation originale de Hiouen Thsang ; traduite du Chinois par Stanislas Julien, membre de l'Institut de France, des Sociétés Asiatiques de Paris et de Londres ; correspondant des académies de Berlin et de St. Pétersbourg ; professeur au Collège de France, &c. Paris, imprimé par autorisation de l'Empereur à l'imprimerie impériale, MDCCCLIII. Chez Benjamin Duprat, libraire de l'Institut, &c.

It is the translator's wish that his work, the subject of which has been more than once discussed in this Journal, should be pronounced upon 'par une personne versée à la fois dans la connaissance de Sanskrit et de la Géographie de l'Inde Ancienne.' While we hope that this wish may be responded to by the competent scholar who has already (Vol. 17, Parts I. and II.) stood forward on behalf of the Chinese Pilgrim, we shall at once publish the opinions of European orientalists on M. Julien's work.

Lassen's praise of it is unqualified, and as his review cannot but be read by all with the greatest interest, we have translated it in *extenso*. We will afterwards quote from Mohl's Annual Report, read on the 13th June last, at the 31st Anniversary Meeting of the Société Asiatique, and from Weber's paper entitled, 'Late researches in the field of Buddhism,' published in his own *Indische Studien*. Vol. III. Heft. 1.

"All friends of Indian antiquarian researches will" says Lassen, "welcome the appearance of this long-expected work, which far surpasses in importance all contributions to our knowledge of India hitherto brought to light from the rich mines of Chinese literature. The exemplary accuracy of the translation, the distinguished individuality of the traveller and the valuable contents of the work, ensure it this eulogium.

"An exact translation of Hiouen Thsang's journal offers to an imperfectly qualified translator two almost insurmountable difficulties.

The first consists in the style of Hiouen Thsang, which often renders it impossible for a scholar acquainted only with the classical Chinese, correctly to understand the text; the second is caused by the numerous Indian words which are either transcribed in Chinese characters or translated into Chinese. Stanislas Julien being unanimously regarded as the first of living Sinologists, and as the scholar who has proved himself to possess the most thorough and comprehensive knowledge of the Chinese language and literature, his translation can be admitted with full reliance on its accuracy, an advantage which does not attach to most communications derived from Chinese sources through other Sinologists. Even Abel Remusat's translation of passages of Hiouen Thsang's work is by no means free from errors, as is shown by several citations (Pref. p. x.) by Stanislas Julien. How indispensable an intimate acquaintance with the Chinese language is to guard against serious errors, the following is a striking example. Hiouen Thsang distinguishes explicitly in his journal those countries which he had visited himself from those of which he had only heard from the mouths of others. This distinction is prominently mentioned in the appendix to *Si-jü-ki* or *Notice of the western empire* (Pref. p. xxxvii.) Abel Rémusat as well as Klaproth misunderstood these two passages, and the latter misled by them, made Hiouen Thsang travel to Sinhala or Ceylon, and from thence return to the mainland. Stanislas Julien on the other hand has, in printing the list of one hundred and thirty-eight kings mentioned by Hiouen Thsang, separated the twenty-eight of which the latter had only oral information.

"The second difficulty is scarcely lighter than the first, and attends the accurate restoration of the numerous Indian words which occur as well in Hiouen Thsang's own journal as in the history of his life and travels, written by Hoeï-li and Yentsong. Stanislas Julien met so many obstacles in his first attempts to restore these words in his translation of the first, that he resolved in 1839, to stop at the 4th book, and not to continue it till he should succeed in discovering a sure method for restoring both kinds of Sanskrit words above mentioned. To form an idea of the great difficulties attending the successful execution of such an undertaking, one must consider how awkwardly the Chinese language

can be made to express properly the many sounds of the Indian alphabet, and at the same time bear in mind that the Chinese translations of Sanskrit words frequently offer no clue to the selection of one of several Sanskrit synonyms in translating the word back into Sanskrit. This uncertainty of choice is augmented by the circumstance that Buddhists when writing Sanskrit now and then use words in a sense differing from that attaching to them in the classical idiom. In order to find the word which and which only would correspond with that of the Chinese text, examples required to be collected which admitted of no doubt, and which would serve afterwards to decide the meaning in doubtful cases. These examples occurring in Chinese-Buddhistical works must have become very numerous, for since the end of the second century A. D., when the translation of Indian books into the language of the celestial empire first commenced, five classes of Indian words had become fixed by unalterable rules, and, for various reasons, could not be translated into Chinese, but only admitted of being transcribed in Chinese characters. Stanislas Julien has given a detailed notice (Pref. p. xvii.) of his labours to secure a sure guide for the restoration of the two different kinds of Sanskrit words. The means which Chinese literature afforded to him were two-fold; Syllabaria, in which Indian words are transcribed in Chinese characters, which however being incomplete were but of little assistance: and Vocabularies, in which Buddhist expressions are explained, and which were of course most useful. Besides a very imperfect vocabulary available in Paris, Stanislas Julien made use of two rare MSS. of this kind belonging to the Arabic Department of the St. Petersburg library. One of them contains an almost complete collection of the sounds and their meanings of such Sanskrit words as occur in the sacred writings of the Thang Dynasty era and is the compilation of Juen-sing (about 649 A. D.) who was employed as a translator by the convent of Great Beneficence and was a fellow-labourer with Hiouen Tshang. The second vocabulary furnished a collection of Indian names translated into Chinese, and is the work of a monk of the convent King-te-the between the years 1143—1157. By comparing the numerous Sanskrit words and notes explanatory of them, contained in the above two MSS. Stanislas Julien collected a considerable stock of such

Sanskrit words as have been used in Chinese MSS. and of which about a quarter are known to have been correctly read. Extending his analysis to other Indian words, his penetrating mind has succeeded in compiling a complete Chinese Sanskrit alphabet by means of which he is in a condition to reduce with confidence to their Indian orthography all Indian words transcribed in Chinese characters. This discovery he first made known in the *Journal Asiatique* IV. Sér. X. p. 81 and he has since perfected it. This it was which enabled him to publish an index of nine hundred titles of Indian works translated into Chinese, viz. *Concordance sinico-sanskrite d'un nombre considerable de titres d'ouvrages bouddhiques, recueillie dans un catalogue chinois de l'an 1306, et publice, après le déchiffrement et la restitution des mots indiens.* *Journ. Asiat.* IV. Sér. XIV. p. 353. By means of this index, a clear idea has first been conveyed of the richness of this branch of Chinese literature, as well as a foresight of the great use to which it may be turned in explaining Buddhism, if qualified scholars will but devote themselves to exploring it. The discovery of this trustworthy process of reducing Indian words transcribed in Chinese characters to their proper orthography, may be considered as an important advance in the progress of Chinese Philology, since it puts an end to the many mistakes and uncertainties on the part of earlier translators of Chinese works containing Indian words. In this as well as in all other translations by St. J. of Chinese reports on India, all Sanskrit words are found so exactly restored, that there is no room for doubt of their correctness, even where they are hitherto unknown geographical names. It is much to be desired therefore, that he may carry out his plan and publish his Chinese Sanskrit alphabet in order that other Sinologists may be able to make use of it.

“The restoration of Sanskrit words translated into Chinese, was attended by the difficulty already pointed out, that of discovering the right word from among various possible synonyms. Here also St. J. has done his best to be accurate. To words of which he entertained the slightest doubt he has with praiseworthy conscientiousness appended a note of interrogation. I can assert on my own experience, that he has always had good reasons for choosing his word, and that in cases where this does not bear its usual meaning,

great caution must be observed by those who are disposed to differ from him. With the exception of Burnouf, no other scholars have devoted themselves thoroughly to the study of Buddhistic Sanskrit literature* and it would add greatly to the reputation of St. J. if he would publish the collections which he has made of Buddhistic-sanskrit words.

“ His profound knowledge and his talents render Hiouen Thsang the most distinguished of those Chinese Pilgrims, who under the influence of pious zeal visited India; and his long residence in, and extensive travels through this country, qualify him above all his countrymen to give an accurate and intelligent report of it. Descended from a distinguished family, he was born in 602, A. D. and acquired early in life a knowledge of the sacred Buddhistic writings, as also of the general literature and history of his country. He devoted himself with special zeal to the study of the works of Lao-tsen and of Tsheng-tsen or Confucius. In his 20th year he received the highest monastic orders. Subsequently he sought out all celebrated masters, conversed with them and examined their doctrines; but a comparison of their doctrines with those of the sacred writings convinced him, that there were most important differences between the two systems, and he was undecided to which to give the preference. He resolved therefore to visit Western countries, and to consult other learned men on those points which disturbed his mind.

“ The object of this notice permits but few remarks on his travels. He left his native land in 629 and traversing the great sandy desert Schamo on the north-west boundary of China, arrived at the capital, of the Ugurs, which as well as its inhabitants are called by him I’gur and which is probably the modern Hami or Khamil. He then proceeded by Dsungarei and over the Musur Dabaghan, the northern extremity of the Tsong-ling or Belurtag, in crossing which, he encountered dangers and difficulties which are described with great graphic power. From the valley of the Jaxartes, situated westward

* Burnouf’s “ Introduction à l’histoire du Buddhism Indien ” is well known, as is his posthumous work, “ Le Lotus de la bonne loi, traduit du Sanskrit, accompagné d’un commentaire et de vingt et un memoires relatifs au Buddhism.”

of the Belurtag, he travelled through Bactria and Western and Eastern Kabulistan.*

"After visiting Kaçmira and the kingdoms of Western and Central India, Hiouen Thsang reached Magadha, the main object of his journey. This country which stands out so prominently in the ancient history of Buddhism, appears to have been then the principal seat of the doctrines of Çakjamuni. Hiouen Thsang found there a great number of sanctuaries and monasteries, in which resided no less than ten thousand monks, distinguished as much by their zeal in

* An error has crept into the review of Hiouen Thsang's travels (p. LII.) given in the introduction. The river Cubhavastee is not the present river Swan, called Soanos by the ancients, it is the Soastos of the ancients, and a tributary of the Pangkora called by the Indians Suvâstu, the present Suwad; see my *Ind. Ant.* vol. II. p. 132, No. 2, and p. 669. Therefore the capital of Udjâna, called Mungkie-li by Hiouen Thsang, is not identical with Mougheti, which is situated N. E. of Attok on the road to Muzâffarâbâd. Hiouen Thsang confirms my former view that Udjâna is situated on the Suwad. It appears from page 84, that he proceeded from Purushapura or Peshawur over a large river which must be the Cabul river, to Pushkalavati the Peukelætis of the ancients, and thence to the town of Uṭakhaḍa, which according to his account was situated opposite to Attok, though the modern name of Attok is clearly derived from it. Hence he continued his journey over mountains and valleys in a Northerly direction and came to Udjâna. The distance of eight hundred li's, equal to about thirty geographical miles, is not too great if we consider that the road followed the windings of the valleys at foot of the mountains, which divide the Indus from the Suwad. As an additional proof, we may mention that the name of the capital of Udjâna is preserved in that of the village Mangalthan in the Yusufzye country (see Account of the Esafzai-Afghans inhabiting Sama (the plains,) Swat, Bunher and the Chamla valley, &c. By Shekh Khash Alee, in the *Journal of the Asiatic Society of Bengal* Vol. XIV. p. 738.) In the enumeration of the Yusufzye tribes, their villages and chiefs, the tribe of the Buner-valley is called the tribe of Sirdar Futteh Khan; that the inhabitants of the Buner-valley are meant by this designation is clear for the countries of the other three tribes are distinctly stated in the notes on the Yusufzye-tribes of Afghanistan by the late Captain Edward Conolly.—*Ibid.* IX. p. 924, Futteh Khan is mentioned as a powerful chieftain of the Yusufzyes, whose authority is also acknowledged in the valleys of the Suwad and Buner. The last named valley is situated east of the sources of the Suwad. According to Hiouen Thsang p. 86, the capital of Udjâna was situated 250 li or about 10½ geo. miles southwest from the sources of the Cubhavastee and therefore probably at the entrance of the Buner-valley from the Suwad-valley. Mangalthan is a corruption of Mangalasthana, the abode of delight; the ancient name was probably Mangala, delightful.

studying the sacred and other writings, as by their piety. He gives a more detailed account of this country than of any other in India. Here occurs the most interesting chapter in the author's biography, that in which he endeavours to give to his countrymen an idea of Sanskrit Grammar, with the rules and principles of which Hiouen Thsang after tedious study seems to have familiarized himself. The Chinese language being known to be deficient in grammatical forms, and even in expression for denoting them, the authors of the biography as well as Hiouen Thsang himself must have had great difficulty in conveying to Chinese readers anything like a clear representation of what the Sanskrit language was. They had to use words which in their own language were used altogether in a different sense, and sometimes they were obliged to give examples of grammatical definitions, scarcely comprehensible by Chinese, this being the only mode of conveying to their countrymen the meanings of the several terminations of nouns and verbs. It may reasonably be doubted whether such a meagre sketch succeeded in giving Hiouen Thsang's countrymen any idea of Sanskrit Grammar.

“After spending five years in Magadha, during which he acquired a complete knowledge of Sanskrit and of the Tripitaka or the three collections of sacred writings, and of other important Brahminical works, Hiouen Thsang determined on visiting those parts of India, which he had not yet seen. He first travelled over a great portion of Bengal and subsequently along the eastern coast as far as Dravida. This name is not used by him in its wider sense, as applied to all the countries where Tamil is spoken, but in its narrower sense as designating a particular kingdom of which Kánki on the Palar river was the capital. Thence he proceeded over the table-land of the Deccan to Konkana on the coast of Malabar. Subsequently he visited the northern countries and those situated in the valley of the Indus, and then he returned to Magadha, where an event took place which more than any other spread his fame in foreign lands. It is related with all its remarkable details at p. 211; we can only here give an outline of it.

“Hiouen Thsang had become very celebrated as well for his knowledge of the sacred books and of other writings, as for his philosophical doctrines, his pious life, and his ascendancy in controversy

with other sects. So much confidence had he inspired, that the disciples of a highly esteemed teacher, Sinharaçmi, deserted their master and joined Hiouen Thsang. The latter had composed a work in which the doctrines of the Mahâjâna Sûtra were declared to be the only true ones, and in which was exposed the fallacy of those of the Hinajâna Sûtra. The word Sûtra, as is well known, signifies with the Buddhists, the first part of their sacred writings in which are contained the sayings and lectures of the founder of their religion, his conversations with his listeners and all his instructions. The simple and earlier Sûtras are called Hinajâna or the little conveyance, the more detailed and later Sûtras, the Mahâjâna or the large conveyance. This work of the foreign Buddhist was communicated by a Brahman to Kumâra of Kamarûpa or Lower Assam, who was so pleased with it that he invited Hiouen Thsang to visit him. He accepted the invitation of the king, but Çîlâditya the more powerful ruler of Magadha coming to hear of it, Kumâra was threatened with his displeasure if he did not send back the celebrated stranger. Kumâra at once resolved in company with Hiouen Thsang to pay his homage to the king of Magadha. Çîlâditya received the foreign teacher with great honors, and being convinced of the excellence of his work, resolved to convocate at Kanyâkubja or Kanoj a great assembly of priests learned in the sacred writings from the several kingdoms of India, in order to discuss the true doctrine with the Chinese teacher. A great number of the most celebrated Buddhist priests and two thousand Brahmans accordingly assembled and Hiouen Thsang was made president of the assembly. For five days no adherent of the Hinajâna Sûtra ventured to dispute the correctness of Hiouen Thsang's dogmas, but the disciples of this school were highly indignant with him, calumniated him and conspired against his life. On this Çîlâditya issued an order to kill every heterodox teacher who dared to menace the life of Hiouen Thsang, and to cut off the tongue of such as slandered him. Those attached to the false doctrine were thus silenced and as during eighteen days none dared to oppose the foreigner, the assembly was dissolved. After obtaining this success his preaching and excessive praise of the Mahâjâna Sûtra persuaded many young men of opposite views to abandon the path of error and to turn into the right way. He received the honorific

title of Moxadeva, 'God of deliverance' and was overwhelmed by Çilâditya and Kumara with other marks of distinction. His reputation for talents and virtue was indeed spread far and wide by this achievement.

"The remaining events of his life p. 257, require but short notice here. After, nearly sixteen years' residence in different parts of India he returned to his country rich in knowledge and carrying with him a valuable collection of sacred books and several statues of Buddha, Çilâditya's influence so far as it extended, provided for the safety of his journey. A second time he traversed the interior of India the Panjab, Kabulistan and Bactria, but returning by a different route, he followed the course of the Oxus, and as far as we know was the first traveller who ever visited the high table-land of Pamer, where the Oxus issues from the lake Sir-i-cul. He sojourned for some time in the three well known towns of East Turkistan Kashgar, Jarkand and Khoten. Thence by a very circuitous route, he reached his native country, where he was received with great ceremony by the emperor Thien-nu-ching-hoang-ti, then residing at Sojang. At the request of the Emperor he composed in 648, a narrative of his travels entitled Si-jü-ki, or rather to give the title in full Ta-thang-si-ju-ki, i. e. a report on the Western countries published under the Thang. The sacred books and statues which Hiouen Thsang had brought with him, were preserved in the Convent of Great Benevolence. The Emperor moreover had a special building erected for him, in which to translate the sacred writings which he had collected in India. He translated into Chinese several most important works, the titles of which need not be mentioned here. He died in 664, and was solemnly buried by order of the Emperor at the public expense.

"From this biographical sketch of the Chinese Pilgrim, it will be seen that his acquaintance with the language and literature of India and his residence in that country, qualified him to give a very exact description of this country and of its then condition. The expectation which we formed of the great value attaching to a work drawn like the present from original sources is fully borne out. Still in judging its merits it must be borne in mind that Hiouen Thsang was a zealous disciple of Çâkyasinha, and therefore that he is not free from prejudice in dealing with subjects in which the interests of his faith are concerned.

“ I turn now to the contents and character of the work, for the excellent translation of which we are indebted to Stanislas Julien. He mentions in the preface p. iv. all the accounts of India as yet ascertained to have been written by Chinese pilgrims, with particulars of their publication. The first of these is the well known work of Fa-hien, who commenced his journey in 399, and is called “ Fo-kue-ki,” or report on the countries of Buddha. The second work is entitled Seng-hoeï-sing-he-si-jü-ki, and its authors are Hoeï-seng and Sang-jün, who were sent to India by the Empress in 518, to collect the sacred writings ; its title signifies Report of Hoeï-seng and Sang-jün deputed to India. Of the third work Si-jü-ki, it has already been remarked that it was composed by Hiouen Thsang in 648, and contains his own description of his extensive travels. The fourth work is that which is now for the first time translated. Of its authors, the first was Hoeï-li a man distinguished for his talents and attainments, who was directed by the Emperor to translate Indian manuscripts under the guidance of Hiouen Thsang. In order to do honor to the latter’s memory and to hand it down to posterity, he resolved (see pref. p. lxxvi.) to compile a separate narrative of the travels of his celebrated countryman, but he died before it was completed. After his death the manuscript of this work was lost, and on being discovered several years afterwards, Hiouen Thsang’s former pupils requested Jen-thsong to arrange its scattered leaves and to write an introduction to it. Jen-thsong corrected the errors, and with the assistance of unedited documents filled up the gaps left by his predecessor ; he also improved its style to which he imparted more perspicuity and elegance. The year of his death is unknown. The complete title of this work is Ta-thang-tsi-en-sse-san-thsang-fasse-tsh’ ouen Hoeï-li-pen-shi-jen-thsong-tsien, and signifies “ the history of the Master of the law from the three collections in the Convent of Great Benevolence, composed by Hoeï-li and Jen-thsong.” The fifth journal of travels was composed by order of the Emperor about the year 730, and its title is : Ta-thang-khieou-fa-kao-seng tsh’ ouen Thang-seng-i-tsing-tsionen i. e. “ a description of the travelling routes of fifty-six pious men who, under the dynasty of the Thangs, explored western China in search of the law.” The sixth and last work of this kind describes the journey of a single Chinese Bud-

dhist Khi-nie, who was sent to the Western countries at the head of three hundred Ġramaṇas and returned in 976. From his notes Fang-tshing-ta, under the same dynasty, composed an account of the travels of Khi-nie.

“Of the six works just mentioned that left behind by Hiouen Thsang himself is unquestionably of the greatest value, as well for the authenticity of its information as for the completeness of its details. Abel Rémusat and Klaproth acknowledge the great importance of this work, and the former announced his intention in a note, p. 77, of his “*Mélanges posthumes*,” to give the details of the travels of Hiouen Thsang in a collection which was to be published of travels of the Samanians in India. Paris possessed at that time but extracts, though very numerous ones from Hiouen Thsang’s works in the *Pin-i-tien*, or Accounts of foreign countries and people, and from these Landresse compiled and communicated in an appendix to Fokoueki, p. 377, a list of the countries mentioned by Hiouen Thsang with detailed notices of them and of their respective distances from each other. He further made an attempt to arrange them in the order in which they were visited, an attempt which could not be successful, because as already mentioned, the distinction between the countries which Hiouen Thsang had visited himself, and those which he described upon the reports of others, had escaped Landresse. The sources of the latter’s compilation must not however be overlooked, since they afford strong testimony in favour of Hiouen Thsang’s credibility.

“With all respect for Abel Rémusat’s acquirements, it may be doubted whether he was qualified to deal with the obstacles which a translator of the travels of Hiouen Thsang must encounter in his obscure style and in the frequent occurrence of Indian words—especially where he was unprovided with a sure method for the restoration of these words. Stanislas Julien as we have seen, discontinued his translation after having been in possession for sixteen years of a complete copy of the original work and latterly of two more copies received from China, and did not resume his task till he had hit on such a method. His introduction explains the process by which he made this discovery. It contains besides a review of Hiouen Thsang’s travels p. xl. a defence of their au-

thenticity p. lxxviii. and some biographical accounts of the authors of the translated work p. lxxvi. Then follows p. lxxix. a sketch of the contents of his contemplated second volume, which as well as the subject of the authenticity of Hiouen Thsang, it will be time to notice hereafter. Stanislas Julien had first intended to print his translation of Hiouen Thsang's own manuscript, but he changed his mind on hearing of the existence at St. Petersburg of a copy of the work written after his death. He then resolved to translate and publish this work, because while giving a full account of the life of the learned and celebrated pilgrim, it is free from the numerous legends contained in his own work and is not so lengthy : for instance the description of Magadha alone occupies 108 pages in the Chinese original. The first five books of the translated work contain the history of Hiouen Thsang's youth and of his travels ; in the subsequent five are related the particulars of the later years of his life. Its conclusion contains, " *Les documents géographiques sur les pays 'mentionnés dans l'histoire de la vie et des voyages de Hiouen Thsang'*" p. 353. These are alphabetically arranged, and are, with few exceptions, taken from the Si-jü-ki.

"The work is of great value in two respects. It describes with great fidelity the condition of Buddhism during the first half of the seventh century in those countries visited by the traveller, and again it furnishes a tolerably complete topographical description of the latter at that time, and as regards India in still earlier times. Occasionally particular facts in the history of India are related. In regard to the first point, the mention made by Hiouen Thsang of the convents and religious edifices in the countries which he visited, if not very complete is of the most important character. Much information is given regarding the doctrines of the eighteen Buddhist sects of which little has been known hitherto but their names. The manuscripts most read in the different convents are pointed out, and we learn from this work a considerable number of titles of other works, not hitherto known, as well as many names of celebrated contemporary teachers. Finally in several instances the traveller adds to the existing stock of important events in the history of Buddhism ; thus he gives p. 95, an accurate account of the labours of the fourth Buddhist Synod.

“ Not less valuable is the geographical intelligence communicated by him, and it is only by means of this translation that its full results will be appreciated. We are indebted to him for a nearly perfect list of Indian countries, as well as of those to the west and north-west, and for accounts of their distances from each other and of the directions of the roads leading to them. Though, as already observed, Hiouen Thsang remarked only what appeared important to him as a Buddhist, we are able with his assistance to give an outline map of India, of part of Balukistan, Kabulistan, Western and Eastern Turkistan, and on this nearly all the countries named by him could be entered. Of these several are first mentioned by Hiouen Thsang and have not been yet found in other works. I should remark here that he seldom specifies the capitals of countries, usually designating the latter after their capitals though not always correctly, for instance Mathura, p. 421, which is the name of a well known town in India. In consulting the geographical details of Hiouen Thsang, it must be remembered that he had no intention of supplying a political geography for the countries of which he speaks, but only here and there names their kings or mentions the extent of their power. It would therefore be a mistake to consider all the countries mentioned by him as independent sovereignties. That I am justified in taking this view is clear from the fact that Çilāditya bestowed the revenues of eight great towns of Odra or Orissa on a celebrated teacher, Gagasena, p. 213, and according to p. 244, the latter could issue orders to eighteen kings, who must therefore have been subject to him. Considering that we know of no contemporary author, who has in any language given a satisfactory account of the geography of those countries in Asia visited by Hiouen Thsang, his communications on this subject cannot but be pronounced most valuable. The distances between the several countries stated by him will generally stand the test, provided no unreasonable demands are made: in one instance only when describing the countries near Guzerat they are considerably too great, and the direction of the roads is incorrectly given as St. Julien (pref. p. lxiv.) has remarked. These mistakes, however, can be corrected by means of such names of places as are admitted and as can be ascertained from other sources, and need not shake the general feeling of confidence in the other geographical notices of Hiouen Thsang.

The complete translation of these will alone throw full light on the character of his contributions, which even in the abbreviated form in which they have hitherto been consulted, have served to elucidate many points in the geography of ancient India.

“It is not therefore easy to conceive how Major Anderson has ventured to assert (“An attempt to identify some of the places mentioned in the itineracy of Hiouen Thsang,” in *Journal of the Asiatic Society of Bengal* Vol. XVI. p. 1186,) on the strength of his readings of some geographical names mentioned by Hiouen Thsang and taken from Arabic and Persian geographical works, that his work was based on these latter, particularly on that of Edrisi, and that it would not be older than one hundred years. He considers the itinerary to be the fabrication of a modern writer who, following the example of Barthélemy, undertook to describe the travels of a fictitious Hiouen Thsang as those of a young Chinese Anacharsis, and to introduce into his narrative the wanderings of different Lamas in the several parts of Asia in which Buddhism had flourished. St. J. very justly (pref. p. lxviii.) thinks it superfluous to refute seriously this preposterous hypothesis, but he is right in defending Hiouen Thsang against the somewhat rash conclusion drawn by Wilson (Lecture on the present state of Oriental Literature in *Journal of the Royal Asiatic Society* Vol. XIII. p. 213) from an extract from the *Si-ju-ki* translated by St. Julien. This extract Wilson says, does not inspire much confidence in the authenticity of Hiouen Thsang’s travels, which have rather a legendary, if not a fabulous character. Against this position St. Julien urges that Hiouen Thsang composed his work by order of the Emperor in the year 648, and that so early as 669, it was analysed in all its details in the great *Encyclopædia Fa-juen-tshu-lin*; further that the legends form but a small part of Hiouen Thsang’s work, which contains besides many notices on the religion, the customs and the commerce, &c. of India, and that as a pious Buddhist he had only recited the legends, exactly as he had received them from others. It may be added, that all who have occupied themselves with the religious and political history of India, are well aware that legends must occasionally supply the want of historical accounts and that handled with the necessary discretion, they contribute to our knowledge of history. The imaginative mind of India has produced numerous legends which form

perhaps its most peculiar creations, so much so that its religious history cannot be rightly understood without a knowledge of the legends.

“After this representation of the chief contents and merits of the work, I feel certain that all my colleagues will agree with me that it will greatly promote researches in Buddhism, as well as in the geography of India and of its adjacent countries in the west and north-west, two branches of oriental archæology to which it contributes the most important information. With regard to India, it supplies in many cases indigenous sources. St. J. has thus added another to his already numerous and important productions in the department of Chinese literature, one which will be of immense advantage to the students of Indian antiquities, and for which he will always be entitled to their gratitude. It has been the means of showing what fruitful results are derivable from continued enquiries in the rich field of Chinese Buddhistic literature. All orientalists therefore must devoutly hope that St. J. will be in a conditon to bring out a second volume, which according to the pref. p. lxxix. is destined to contain the following additions. First a translation of all extant accounts of Chinese pilgrims in India, of which two, namely, that of Fa-hian, the other of Song-jung (the latter in C. F. Neumann’s *Pilgrimages of Buddhist priests from China to India*) have already been translated, though not quite with the accuracy to be wished. We shall thus command the means of extending our acquaintance with India through Chinese sources. St. J. proposes also to give a complete analysis of all the most important facts of the Si-jü-ki, which is to be preceded by a complete translation of Hiouen Thsang’s description of Magadha. It would enhance the value of this analysis very much, if the legends were only given in abstract and the historical facts in full. Not less useful will be the compilation of Chinese accounts from the writings and biographies of celebrated persons mentioned in the translated work. These bibliographical and biographical notices are to be followed by a chapter on chronology, which will be taken from the great work *Fo-tou-tong-ki* compiled in the 11th century. To these will be added biographies of the six and twenty Patriarchs. These were not, it is true, regarded by the Chinese as the supreme heads of Buddhism in India, and their biographies teem with legends possessing no chronological value, but the latter still contribute many useful materials to the history of

Buddhism in India. Two indexes will close the work, one a Chinese Sanskrit and the other a Sanskrit Chinese index, together with a list of French words requiring explanation and two very old Chinese maps with another compiled for the work by the well known Vivien de Saint Martin.”

C. LASSEN.

Mohl's notice of the translation glances only at some of the points remarked on freely by Lassen, but he is puzzled why M. Julien should have preferred translating the biography before Hiouen Thsang's own narrative: “On se serait attendu à ce qu'il eût choisi la première (la réduction du voyageur même) et se fût servi de la seconde comme supplément et pour en tirer des éclaircissements, car il s'agissait d'un document historique de la plus grande importance, qu'on devait désirer posséder dans sa forme la plus ancienne et la plus authentique. M. Julien choisit comme texte à traduire la biographie, en réservant la relation du voyageur même pour les éclaircissements et les suppléments. Les raisons qui l'auront déterminé à cette déviation de la marche que la nature des choses paraissait prescrire, doivent être très-fortes; mais je regrette qu'il n'ait pas cru devoir les indiquer.”

He proceeds however—

“Chaque nom d'homme ou de livre dans l'Inde, qui acquiert une date fixe, est un jalon de plus pour l'histoire de ce pays, et l'on comprend aisément de quelle importance est le travail ingénieux de M. Julien, qui nous permet de les retrouver. Dans tous les cas où l'auteur chinois indique le son et le sens d'un mot sanscrit, on peut être à peu près sûr de la restitution de M. Julien; quand l'auteur n'indique que le son, les règles de transcription que M. Julien a trouvées déterminent encore presque avec certitude le mot sanscrit; mais quand il n'indique que le sens, il peut rester des doutes sur les noms formés par le traducteur d'après cette donnée nécessairement un peu vague. Mais ce qui est positivement acquis à l'histoire est un gain énorme, et des renseignements venus d'autres côtés contribueront probablement à mettre hors de contestation les points qui aujourd'hui ne peuvent pas encore être fixés avec certitude, et que M. Julien a eu soin de marquer lui-même.”

The notice terminates with an expression of regret that M. Julien should have spoken in a disparaging tone of Rémusat, “restaurateur des lettres chinoises en Europe.”

Weber while giving Julien's work a warm welcome avows his disappointment at the non-publication of a literal translation of the original narrative of Hiouen Thsang. He notices also the vague tone in which the intention to publish so great a desideratum is announced by Julien, 'sans renoncer toutefois à publier plus tard le livre même de Hiouen Thsang.' The translation of this biography does not, in his opinion, add much information of importance to what has been furnished by the Editors of the *Foe-koue-ki* and by the detached translations from the text of Hiouen-Thsang already contributed by Julien, and published by Reinand and Lassen.

As regards the process of restoring Sanskrit words for which Lassen has given such credit to Julien, and the results of which were published in the *Journal Asiatique** in 1849, Weber points out a serious omission which deprives the Chinese-Sanskrit Concordance of much of its value. The latter contains merely the Chinese titles and the Sanskrit titles as restored by Julien, and not the phonetic transcriptions, from which these last were restored, an omission which debars others from judging for themselves on the accuracy of the restorations: for instance—

"No. 47, Changtso-pou-tsang of the Concordance is shown as Sarvâstivâ-davinaya. No. 119, Chone-i-tsie-yeou-pou-pî-naï-ye-tsang is also shown as Sarvâstivâ-davinaya. But in enumerating the books brought to China by Hiouen Thsang in the 6th book of this biography, the author has mentioned the sacred books, or memoirs on the discipline and philosophical treatises of the school Chang-tso-pou as distinct from others of the same character of the school Chone-i-tsie-yeou-pou. Only one of these schools therefore can really be sarvâstivâda. Perfect reliance cannot be placed on the restoration from the Chinese of the Sanskrit titles of Buddhist works till after due collation of Chinese with Tibetan titles which last are generally found accompanied by the Sanskrit title. According to the Russian Father Habakuk it would seem that in a Peking edition of the *Kagyar*, which has not yet reached Europe, much of the materials for such a collation already exists."

Weber also notices the terms in which Julien has spoken of Rémusat. He concludes by earnestly entreating the latter to lose no time in bringing out his translation of Hiouen Thsang's original work.

* See title of article quoted above by Lassen.

Literary Intelligence.

The *Journal Asiatique* for December 1852, completing its fourth series and 20 vols. contains an interesting letter to M. Mohl by M. Place, on an expedition made by the latter to Arbela from Khorsabad where he is following up the discoveries of Botta. The 2nd paper is by Cherbonneau and is entitled “*Documens inédits sur l’hérétique Abou-Yezid-Mokhalled-Ibn-Kidad de Tademket*,” translated from Ibn Hammad’s *Chronicle*. There is an interesting letter by de Hammer-Purgstall giving the titles of 30 Arab works on horses.

The January No. has an extract from the *Romance of Antár* by G. Dugat. The subject is historical, and has been treated at length by Caussin de Percival. The paper is entitled ‘*Ses jours du bien et Ses jours de mal du Roi Nomán*.’ The rest of the No. is occupied by the conclusion of Du Caurroy’s notice of the *Musalmán Civil Code* ‘rite hanéfi.’ In the February and March No. Rousseau prosecutes his translation of *Et Tidjani*, a traveller in Tunis and Tripoli, and de Meynard commences that of the 4th Part of Thâlebi’s *Yétimet ed-Dehr*, which describes the writers of Transoxiana, Khorasan and particularly of Nissapur under the dynasty of the Samanides and under the first Guznevide Sultans. The first part of this work was published at Leipzig in 1847, by Dietériçi. Amari contributes an article on an old MS. in the Bodleian library, containing the replies of a Spanish philosopher Ibn Sab’in to questions put to him by Frederic II. of Sicily.

In No. 3 Rousseau’s translation is completed, Dugat gives a paper entitled *Etudes sur le Traité de Médecine d’Abou Djafar Ahmad (Zad al Moçafar)* and Defrémery writes on the reign of the Seldjouk Sultan Barkiarok 485—498 A. H. from which the power of that family dates the commencement of its decline. The translation of an extract from a work by Ibn Elkouthyia by Cherbonneau closes the No.

The June and July Nos. are mostly occupied by correspondence, which comprises a long and interesting letter from M. Fresnel at Hillah. Sanguinetti gives the text and translation of a satirical fragment of which the MS. is in the Leyden library. It contains a

spirited criticism in verse of the principal Arab tribes by different ancient poets.

Mohl's Annual Report published in the August No. of the *Journal Asiatique* announces the intended publication by the Paris Asiatic Society of a new series of works called the 'Collection des auteurs Orientaux.' The first work of the series is the *Travels of Ibn Batutah*. The text is to be accompanied by a translation by Defrémery and Sanguinetti, and will occupy 4 vols., of which the first will by this time have been published. The second work which is in the press is Masoudi's 'Prairies d'or,' and the third will be Ibn Hisham's biography of Muhammad. The work is to be brought out in an inexpensive form.

The Report reviews the labours of the West and of the East so far as they are known in Europe, in the field of oriental literature during the last two years. A summary, which can scarcely be more than an enumeration of the works reviewed, will give information of interest to many of the distant readers of this journal.

"Hammer's *Histoire de la littérature Arabe* is already in our Library. The same author has since published three memoirs on Muhammadan mythology and demonology, on the origin and composition of Arab names, and on the form and manufacture of bows and arrows as used by the Arabs and Turks. Reinaud and Derenbourg's new edition of '*Les Séances de Hariri*' is accompanied by an Arab commentary chosen by Silvestre de Sacy and by a detailed notice of Hariri which the discovery, in the *Bibliothèque Impériale*, of new and authentic documents has enabled the editors to compile. '*Ibn al Athiri Chronicon*' is the title of a work published at Upsal by M. Tornberg, consisting of the 11th vol. of the *Chronicle of Ibn al Athir*, one of the principal sources from which later authors have drawn their information. This volume comprizes the period between 527 and 583 A. H., but it is unaccompanied by either preface or translation.

"At Leyden has appeared the text of the *Travels of Ibn Djobeir* an Arab of Spain who wrote in the 12th century of our era. It is edited by Mr. Wright who has promised shortly to publish a translation. That of another work of the same character, being the *travels of Scheikh al Tidjani in Tunis and Tripoli*, by M. Alphonse Rousseau, has, as above stated, been published in the *Journal*

Asiatique. M. Cherbonneau's translation of that part of Ibn Batutah's Travels which relates to Northern Africa and Egypt, is a further contribution to this department of literature.

"The 1st volume of de Slane's translation of Ibn Khaldoun's History of the Berbers has been published—the text, it will be remembered, was brought out some years ago by the same editor. An introduction gives an analysis of the entire work, a genealogical list of the Maghrebin Arab dynasties, the life of Ibn Khaldoun, and an alphabetical table of geographical names, while an Appendix contains extracts relative to the Arab conquest of Africa from a history of Egypt by 'Abderrahman ibn' Abd el Hakim and from the great work of Noweiri. The Abbé Bargès has translated another Arabic work on the Berbers called History of the Beni Zeian, kings of Teemcen, a Berber family, which rose to importance on the ruins of the Western Caliphate, and maintained their position from the 13th to the 16th centuries of our era.

"Sprenger's Life of Muhammad is then noticed as adding many new facts to what was previously known of the prophet's life, together with another work entitled, Life and religion of Muhammad as contained in the Sheeah tradition of the Hyat al koloub. The author, Mr. Merrick, is an American Missionary, who lived for some years in Persia, and whose object was to give a faithful exposition of the Sheeah traditions according to the Hadits acknowledged by that sect. Muhammad Baber, the author of the Hyat al koloub was one of the most esteemed of Sheeah writers, and died in 1697.

"Dr. Juynboll of Leyden, besides continuing his Lexicon Geographicum, has commenced an edition of Abou Mahasen's Annals of Egypt. This author resided at Cairo in the 15th century and was the disciple and rival of Makrisi. The text will occupy 12 vols. and is to be accompanied by a translation. Dozy too has added another volume to his materials for a future history of the Arabs in Spain, containing extracts from the several Arab authors who have written on the Abbadian dynasty. Another work by the same author, giving portions of two Chronicles on the subject of the Arabs of Spain and Africa, opens with a valuable introduction which criticises the Arab Spanish historians, exposing their defects and indicating such of the works as it is of importance to recover.

“Kosegarten’s 3rd vol. of *Tabari* is composed entirely of anecdotes connected with the battle of Kadesia, which left Persia at the mercy of the Arabs.

“The philosophy of the Arabs has been illustrated by works by Haarbrücher of Halle, Renan and Poper, the first of whom has completed the translation of a work on the religions and sects of Scharistani. Perron has completed his *Précis de jurisprudence Musalmâne*, a translation from Khalil Ibn Ishak a jurisconsult of great authority. To this department belong also Baillie’s works on the law of sale and the land-tax, and Morley’s *Digest* which are accordingly here noticed. Flügel’s *Bibliographic Dictionary of Hadji ’khalfa* is completed all but the appendix: it now consists of 6 vols. published at the expence of the London Translation Fund.

“Freytag has completed an edition of the text and translation of Abou Temam’s *Hamasa*, the only extant anthology of five similar collections made by Abou Temam, a poet of the 3rd century A. H. while snowed up at Hamadan. This was the most brilliant period in Arab literature, when Greek and Indian science was studied for mental culture, while the old desert poetry which expressed the national sentiments in the purest and most idiomatic style, directed the taste and preserved the language. Many of the poems in this collection were composed before and during the time of Muhammad. Another work now completed by Freytag is an edition of the *Fakihet el Kholafa* by Ibn Arabschah, an author of our 15th century better known by his life of Timour. The text of this was published some time back and to this has been added a small vol. of notes, which were very necessary. The *Solwan* or *Waters of Comfort* of Ibn Zafer, a Sicilian Arab of the 12th century, has been translated and published by Amari in London. The work is a collection of anecdotes and fables, and its object is to exhort the reader to the exercise of virtue. Of the same character is another work entitled *Turkish Evening Entertainments*, translated by Mr. Brown of the American Legation at Constantinople, from a Turkish author of the 17th century.

“Dietériçi’s translation of Ibn Akil’s *Commentary on the Grammar of Ibn Malik* will be welcomed by all who study the philosophy of languages—as will also the *Adjroumieh*, a text and translation of

which has been published at Cambridge, this being in general use in oriental schools. A treatise of Alkarkhi an Arab mathematician of our 11th century which has just been brought out by Wôepcke will supply a gap in the history of mathematics and fix the true position of the Arabs between the Greeks and the Italians, a position which has given rise to much discussion.

“The review of what has been done by France and England respectively in Turkish Arabia is very short, but a contrast drawn between the style of publication adopted in the two countries, announces the fact that neither Rawlinson nor Layard possesses a copy of Botta’s expensive work.

Westergaard’s edition of the Zend-Avesta of which the first vol. is published will contain the text of the Zoroastrian sacred books with variants from all the MSS. accessible in Europe, together with a translation and a history of Persia prior to the Arab conquest. A Dictionary and Grammar of the Zend language will be added. The same author has published the facsimile of a Pehlevi MS. called the Bundehesch. Spiegel’s text and translation of the Avesta are appearing in two separate works, the first vol. of the latter containing a very able essay on the religious history of Persia. The principle which he has observed in interpreting the texts is to follow as closely as possible the Persian tradition such as it is given in the Pehlevi and Pazend translations, leaving for prosecution hereafter the task of discovering the ancient meaning of these works by the means furnished by a study of the Vedas and by Comparative Grammar. It is only thus that the true sense of much of the Zend Avesta can be obtained, and indeed on some points we are already better informed than were the translators of Sassanian times. The study of Zend in Germany has made such progress that Lassen has just brought out a class book for use in the universities.

“Bopp, having published the 6th and last vol. of his Comparative Grammar, is now engaged in revising the first parts of this work.

“Johnson’s new edition of Richardson’s Persian Dictionary which has been brought out at the expense of the East India Company, contains 30,000 words more than the previous edition of 1829. The true merit of this edition consists in the greater care with which Johnson has examined the original Persian Dictionaries which form

the base of the work. But really useful as this compilation is, it can never be what a Thesaurus is. On such a work Quatremère has now been engaged for forty years, and its publication is anxiously looked forward to.

“Chodzko’s Persian Grammar or ‘Principes de l’ Iranien moderne will be most useful, not only to such as desire to study the language now actually spoken in Persia, but to philologists. The same author has commenced the publication of a collection of Taziehhs under the title of ‘Repertoire du théâtre Persan,’—His MS. is from the library of Futteh Ali Shah and contains 32 dramas. A translation of the whole collection will follow.

“The Bostan of Sadi and the Fragments of Ibn Iemin have been translated into German verse by Schlechta at Vienna, and de Schach at Berlin has similarly translated some of the Episodes of Ferdousi’s Shahnameh. Bland’s century of Persian Ghazals introduces ten poets, whose works have not yet been published in Europe. The history of Persian poetry on which this author has now for some time been employed, and for which he has collected a magnificent supply of MSS., is anxiously looked for. Another translation has been made of the Gulistan by Eastwick, and a punctuated edition of the text with the necessary vowel marks has been published by Dr. Sprenger. Col. Ouseley moreover has brought out a good edition of the text of the Anvari Soheilee, which was much wanted in Europe.

“New editions of Ferdousi, Hafiz and other works from the lithographic presses of Teheran and Tabriz have reached Europe, and the Dabistan has been republished at Bombay.

“In Sanskrit the study of Vedic literature engrosses every year more attention. Langlois has completed his translation of the Rig Veda. Roth and Whitney are engaged in editing the Atharva and Weber is continuing to publish the White Yadjur. Röer will soon be commencing with the Black Yadjur and still prosecutes his task of publishing in the Bibliotheca Indica a complete series of the Upanishads. Weber’s Essay on Indian literature, which is devoted mainly to the Vedic period, is a most interesting discussion of subjects, which thirty years ago few had the opportunity of making themselves acquainted with. Barthélemy St. Hilaire’s Memoir on

the Sankhya philosophy examines at great length the system of Kapila, and attributes to his school the philosophical doctrines of Sakhyamunee.

“Gorresio at Paris has published the 2nd vol. of his Italian translation of the Ramayana, and Parisot the first vol. of his French translation, the text followed by both being that of the work current in Bengal. Pavie has translated the 10th book of the Bhagvat Purana. The means of studying Sanskrit have been facilitated by Ballantyne’s text and translation of the Laghou Kaumudi of Varadaraj, the Grammar principally used in the Bráhmancial schools and by Benfey’s Grammar. William’s English and Sanskrit Dictionary, a 3rd edition of Wilson’s Dictionary now under preparation, and a Sanskrit Thesaurus about to be published at St. Petersburg by Bôthlingk and Roth, are all works indicative of the progress which is being made in establishing the true relations of European languages with the Sanskrit. Holmboe, moreover,* has published an excellent grammatical and lexicographical comparison of Scandinavian dialects with the Sanskrit, and Delatre has commenced on a similar comparison of the French language.

“Lassen’s Antiquities of India, of which the 2nd vol. is now complete, is an instance of what European criticism can construct from the most heterogeneous elements. The political history of India must always be very incomplete, but it is probable that its moral and social history will one day be better known than that of any people of high antiquity, and the value of this attempt of Mr. Lassen’s cannot be too highly estimated.

“In Buddhist literature Burnouf’s *Lotus de la bonne loi* is a translation from the Sanskrit, and is accompanied by a commentary and by 21 tracts on Buddhism. The same author has left a vast quantity of materials for his History of the Buddhism of the South, on which he was engaged when he died, and it is hoped that much of it will yet be published. Spence Hardy’s works are the result of a twenty years’ residence in Ceylon, where the author collected a large library of MSS. bearing on Buddhism. Latter has published Selections from the vernacular Buddhist literature of Burmah, and Bennet, an American Missionary has translated the life of Gaudama from the same language. But St. Julien’s biography of Hiouen Thsang is

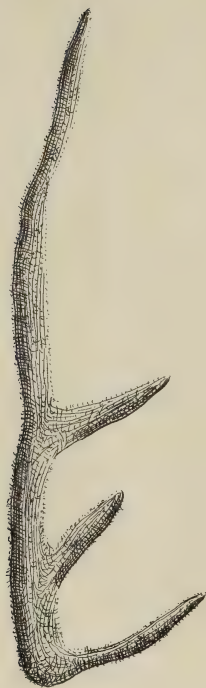
perhaps the most interesting contribution to this department of literature.

“Bazin has collected together his articles in the *Journal Asiatique* on the learned and popular literature of the Chinese under the Mogul dynasty, and Dr. Medhurst has published the Anglo-Chinese portion of his Dictionary which is compiled principally from the Kang-hi, and will be invaluable to Europeans in China.”

To return to our notice of the continental periodicals. No. 4 of the *Zeitschrift* of the German Oriental Society opens with a paper by Dr. Oslander on the Pre-Mohammedan religion of the Arabs, a subject which he observes has never yet been thoroughly examined. Caussin de Perceval and Dettinger have added something to the information collected by Pocock, but to enquire into the old Arab religion was not a part of the plan of either. The writer's object here is, to explain the seat and limits of each particular worship which prevailed in Pagan Arabia, as well as its character and meaning. Haug continues his paper on Zend researches and Hammer his extracts from Saalchi. Stenzler has a paper on Paraskarás Grihya Sûtra, a work which he describes as forming a supplement to Katyáyana's Çrautâ-sûtra, and of the contents of which he gives an abstract.

No. I. of the same Journal for 1854, is taken up entirely by an elaborate paper on Coins with Pehlevi Legends by Dr. Mordtmann. It is accompanied by ten Plates which give the alphabet and the readings of the figures and of the mints. Among the reviews is an interesting notice of Böhtlingk's Grammar and Dictionary of the Jakute language.

The 1st No. of the *Indische Studien* for 1853 contains an alphabetical list of the openings of the several verses in the Rik Sanhita. The list had been commenced by Professor Roth, by whom it was made over to Mr. Whitney, the labours of both being prosecuted to a termination by Pertsch. The only other paper is by the editor and is entitled ‘Recent Researches in the field of Buddhism.’ It is a review of Spence Hardy's, Burnouf's, and Julien's publications and his remarks on this last work will be found in substance elsewhere.



Horn of the Shou Rubge.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR FEBRUARY, 1854.

At a meeting of the Society, held on Wednesday the 1st instant, at the usual hour,

SIR JAMES COLVILLE, K.T. President, in the Chair.

Presentations were received—

1. From Capt. W. S. Sherwill through Capt. Thuillier, four coins from Sikkim.

2. From Capt. H. L. Thuillier, Deputy Surveyor General, Revenue Survey Maps of the following districts :

Bhuteanah—Seebpoor, Upper Assam—Purneah—Tirhoot and Chittagong.

3. From Mr. Thompson, a Burmese Dagger.

4. From J. A. Cockburn, Esq. Superintendent of the Barrackpore Park, Carcase of a Nil Gai, *Damalis Risia*.

5. From the Government of Bengal through W. J. Young, Esq. Under-Secretary, for the Museum of Economic Geology, a Map of the Chittagong district.

6. From the Academy of Sciences of Bordeaux through Mons. P. F. Guestier, a member of the Academy, Acts of the Academy for the year 1852.

7. From the Imperial Academy of Vienna, Proceedings of the Academy, Vol. X. parts 4, 5.

8. From Dr. Campbell, Darjeeling, a skin and a tracing of the horns of the "Shou Rubge" of Thibet.

"The horn" says Dr. C. "is now in my possession and said to be of the ordinary size. This deer is described as being a good deal

smaller than the large "Shou" (see Journal Asiatic Society for 1850) and larger than the spotted deer of India, to be of the same colour as the Shou, and to inhabit the same localities, viz.: the upper portion of the Choomtee valley where open glades and trees abound.

"N. B. 'Shou' is the generic term for Deer in the Thibet language. This species is Shou Rubge or the eight-antlered deer. The larger animal is Shou Kupelroo 'or the ten-antlered deer.' "

The following gentlemen, duly proposed and seconded at the December meeting, were balloted for, and elected ordinary members :

Bábu Nagendranáth Tagore.

G. H. Freeling, Esq. B. C. S.

The following were named for ballot at the next meeting.

Major M. L. Loftie, proposed by Dr. Sprenger and seconded by C. Allen, Esq.

Lt. Hitchens, Bengal Engineers, proposed by Mr. B. H. Hodgson, and seconded by the President.

C. Chapman, Esq. B. C. S., proposed by Mr. Grote, and seconded by Dr. Sprenger.

The Council submitted a report stating that they have appointed the following sub-Committees under By-Law 80.

Sub-Committee of Finance.

C. Allen, Esq. and Major W. E. Baker.

Sub-Committee of Oriental Philology.

Dr. Röer, Principal W. Kay, Rev. J. Long, Professor F. E. Hall and Lt. W. N. Lees.

Sub-Committee of Natural History.

Dr. G. G. Spilsbury, Dr. H. Walker, Dr. H. Falconer, Dr. A. C. Macrae, and Major W. E. Baker.

Sub-Committee of Library and Journal.

Capt. H. L. Thuillier, Dr. H. Walker, H. Woodrow, Esq. and Rev. W. Kay.

The President in a short speech announced to the meeting the death of Sir H. Elliot and then proposed the following resolution.

That the Society desires to record its deep sense of the loss it has sustained by the untimely death of Sir Henry Miers Elliot, K. C. B. a man not more eminent for the civil services which had earned

such general recognition and high reward than for the variety of his knowledge and for the zeal and ability with which, amidst the distracting cares of official life, he pursued his researches in the field of Oriental literature.

Mr. Grote seconded the resolution, which was carried unanimously.

Mr. Houstoun gave notice of a motion for the next meeting of the Society, to know under what decision of the members assembled in General Meeting, letter No. 217 of the 3rd December, 1853, was written and made to appear as if the act and deed of the Society.

Communications were received—

1. From E. C. Bayley, Esq. C. S. enclosing a note on the Khunniara Inscriptions.

2. From W. G. Young, Esq., Under-Secretary to Government of Bengal, stating with reference to a communication from the Society under date the 3rd inst. that His Honor the Deputy Governor of Bengal has been pleased to sanction an annual grant of Rupees 140 for keeping the ruins of Gour and Puruah free from jungle, and that the conservancy of the ruins has been placed under the Joint Magistrate of Maldah.

3. From H. Cooper, Esq. Officiating Under-Secretary to Government of India, forwarding transcripts of inscriptions copied at Sanchi, in 1850-51, by Lt. Maisey, with a view to their translation.

4. From Dadoba Pandurang, Esq. Ahmednagar, enclosing a list of Mahratta books for sale at the Elphinstone Institution.

5. From W. G. Young, Esq. Under-Secretary to Government of Bengal, communicating a Memorandum on the Coal stated to occur in the Sivok Nuddee near the river Teesta, by Professor T. Oldham, Superintendent of the Geological Survey of India.

The following is the substance of the Memo.

“Arriving at the Sivok Nuddee I devoted some days to the careful examination of the district adjoining, but was not able to discover the smallest trace of the existence of any bed or regular deposit of coal. Coal may undoubtedly be found in the rocks and in the detritus of the stream bed, but it only occurs as the carbonized bark of stems of trees of various sizes, imbedded in the thick formation of pebbly sand-stones which occur here. On these stems the

carbonized bark is sometimes tolerably thick, varying from one inch to $1\frac{1}{2}$ inch, occasionally very thin, and often absent altogether.

“The central portion of these stems is invariably composed of hard sandy layers, of which the fissures and divisional planes are coated with carbonate of lime.

“These stems are frequently much worn and rounded, and have evidently been carried for some distance, and deprived entirely of their bark and external covering before being imbedded. In other cases there is nothing save the position of the stems in the rocks, to shew that they have not been imbedded where they grew.

“I did not find a single instance of an upright stem; all are on the planes of bedding of the rock or but slightly divergent from these.

“These stems vary much in size, being from a few inches to ten and even fifteen feet, of which length I measured one. Of this, the thickness in the centre was seven inches, and its breadth one foot three inches, being considerably flattened. One portion of this large stem, was altogether without any carbonized or coaly integument, while in other parts this coaly envelop was more than one inch in thickness. The series of rocks in which these stems occur is of very considerable thickness and consists of a number of alternating beds of coarse cherty shales, and thick masses of grey, and brownish sand-stones, generally highly micaceous. There are but slight traces of calcareous matter throughout, lime occurring only in earthy calcareous nodules, in a few of the shaly beds. The whole group is not less than 4000 feet in thickness, and throughout dips at considerable angles to the north, and north-west, never less than twenty degrees, but generally ranging from forty-five to sixty.

“Through the greater portion of this extensive series, but invariably in the coarser, and more pebbly sand-stones of the group, occur the stems which we have noticed, and in the formation extending along the base of the hills into the Bhotan territory, these stems are found in the same rocks, occurring along the bed of the Teesta as well as along the bed of its tributary the Sivok; and no doubt, continue to the eastward also; indeed they appear slightly more abundant and larger in the Teesta, than in the Sivok.*

* Sivok, and Chawa or Chiwo, the two names by which this Nuddee has been

“The peculiar structure and aspect of pieces of this coal, referred to by Mr. Piddington in his report, are due solely to the original structure of the barks of the stems still preserved in their present mineralized condition. In one of the beds of finer shale near the base of the formation, I found numerous impressions of leaves of trees and small fragments of carbonized stems, which will be subjected to further examination, but no other fossils whatever were observed. The characters of these leaves at once point out the geologically recent epoch of the rocks in which they occur. There is no trace of the great nummilitic group so largely developed along the base of the Himalayan range, both the East and West, and taking this into consideration along with the very recent aspect of the few vegetable remains which have been found, I am disposed to refer the entire of this great thickness of rocks, to the more recent periods of the Tertiary epoch.

“There is not the slightest prospect of this locality proving in any way useful as a source of coal for any commercial purposes. Much of the sand-stone would make a good dry building stone, easily convertible, and, for interior work or wherever protected, durable.”

6. From W. J. Hamilton, Esq. Secretary Geological Society, London, acknowledging receipt of the Journal Nos. 232 to 235 and Catalogue of Birds.

7. From Dr. R. Anger, Librarian, German Oriental Society, acknowledging receipt of the Journal Nos. 232 to 235.

8. From J. Barlow, Esq. Secretary Royal Institution, London, acknowledging receipt of the Journal Nos. 232 to 235.

9. From Major J. Abbott, enclosing the following papers—

1. On the Popular Ballads of the Punjaub.
2. Gradus ad Aornon.
3. On the Mirage of India.

10. From the Government of Bengal through Mr. Under Secretary Young, enclosing a Memo. of observations made by T. Braddell,

designated, are only the different modes of pronouncing the same name by the Lepchas (Sivok) and the Michis (Chewa or Chewah). The latter people in most cases give the harder sound of ch to the same words, which the hill tribes pronounce with an S. Thus a large hill near the source of this Nuddee is Sitong, among the Lepchas and Chitong among the Michis, &c. &c.

Esq., Assistant Resident, Malacca, during a journey to Mount Ophir Gold Field, and the River Moor, together with a note on the same by Professor Oldham.

11. From H. Piddington, Esq., Curator Museum of Economic Geology, submitting a paper for the Journal on the quantity of Silt held in suspension by the waters of the Hooghly at Calcutta in each month of the year.

The Librarian and Curator submitted their usual monthly reports.

Report of the Curator, Museum of Economic Geology.

Geological.—Forwarding, now some two or three years ago, some specimens sent down by my friend Major Jenkins for that purpose to a relative of his, the Very Rev. Canon Rogers of Exeter Cathedral, I took occasion to request of that gentleman the favour of any specimens with which he could oblige us, sending him at the same time one of the circulars of the Museum of Economic Geology; and he has in return* sent us two small boxes containing 25 fine specimens of ores and rocks, almost all of which will be additions to our cabinets. The catalogue is annexed.

I have received from the Government of Bengal, the accompanying report on the gold country about Mount Ophir at Malacca, with Professor Oldham's remarks on it, but I have not yet received the specimens which Professor Oldham was to send to us. I suggest that these reports will make a good paper for the journal.

Museum of Economic Geology.—Major Baker has procured for us through Colonel Napier two fine specimens of the iron ores of Korana described in my Report Journal No. 2 of 1853, one of which is the Isomorphic Carbonate of iron therein described, in its rock of milk quartz, and the other explains a word in Mr. Purdon's report, which I forbore at the time to remark upon, thinking that it must have been an oversight. It will be seen page 208 that that gentleman calls the iron ore of Korana a Hæmatite, while my analysis proves it to be a carbonate; but the second specimen of the two now sent shews that we are both right; for this last specimen is a fine Hæmatite and would probably furnish a first rate quality of iron if properly smelted. There is also a specimen of the rock of the Korana hill which is a schistose hornblende sandstone upon a hard grey sandstone rock.

I have in hand a large collection of 70 specimens from Captain Haughton from the S. W. frontier, but these being but partially examined and

* The boxes seem to have been delayed at the India House for a long time.

some of them requiring much care, I defer any account of them for the present.

I have put into a paper for the journal my account of the new mineral NEPAULITE of which beautiful specimens are on the table. This paper will be followed by one or two more describing the other products which this donation from His Excellency General Jung Bahadoor, and Major Ramsay's zealous attention to my frequent, and I fear troublesome requests, will enable us to add to the science of Mineralogy in India.

Report of the Curator of the Museum of Economic Geology for January, 1854.

(Read at the February Meeting.)

Geological.—I have put into the form of a paper for the journal the curious results which I have obtained from an examination of the water of the Hooghly taken at Noon on the first of every month in the year, which are of great scientific interest in many points of view, and will eventually become so economically, I have no doubt. I refer to the paper for details which cannot be conveniently abridged here.

Captain Bowen of the P. and O. S. Str. Bengal has obliged me with the following note of a tract of white milky sea passed through by him on his recent voyage from Aden to Ceylon.

Monday 16th January, 1854.

At 7 P. M. ship entered into a perfectly white milky sea, cloudy on the horizon but perfectly clear; bright star-light; moon half an hour from rising.

Stopped and tried for soundings 90 fathoms. No bottom.

Density of the water before entering that strange appearance 11°. Density of the water when sounding 14°.

Sympiesometer,	29°	90'
Barometer,	30	12
Thermometer,	80	0
Latitude 11° 59' N. Longitude,	59	2 E.

I may remark that previous to entering this strange sea, there was a moderate ripple on the water and after leaving it also, but smooth, like oil when in it.

(Signed) JOHN BOWEN,

S. S. Bengal from Aden to Ceylon.

In his letter Captain Bowen says: "I once saw the like on the Malabar coast fourteen or fifteen years ago, but not at all to the extent this was; for the horizon (on this occasion) was in the same state as the water along side."

I have once before recorded (Proceedings for March, 1847, Journal Vol. XVI. p. 382), an instance in which this milky luminous appearance was seen off the Cape of Good Hope, and Dr. Buist in the transactions of the Bombay Geographical Society has also recorded an instance in which a Company's Steamer from Bombay to Aden passed through a large extent of it; and it is I think mentioned also in Horsburgh and some modern books of voyages? but we are so ignorant to what it can be owing, that every accurate notice of it is worth registering. If we could obtain some bottles of the water, carefully put up and corked, we might perhaps, between chemical testing and the microscope, arrive at some results worth knowing; unless the appearance be a purely electrical phenomenon?

Mineralogical.—We have received from Rev. Mr. Phillips a specimen of Sulphate of Barytes from Landour and of saccharine Gypsum from Mussoorie, both of which from their localities are acquisitions.

Economic Geology.—We have to announce here the discovery of copper ore within twenty miles of the station of Darjeeling.

The letters from Dr. Campbell are as follows:

No. 45 of 1854.

To

H. PIDDINGTON, Esq.,

Curator Museum of Economic Geology, Asiatic Society, Calcutta.

SIR,

On the 29th ultimo, I had the pleasure of sending to you by letter dák, a specimen of copper ore from Chakoong in Sikim, and of the copper extracted from it.

2. On the first instant, I despatched to you by dák banghy a specimen of copper ore from Pushak in the British territory attached to Darjeeling.

3. May I request that you will favour me with a report on these ores, and the metal.

4. Since the despatch of the specimens to you, I have visited the Pushak district. Annexed is copy of a letter from me to the Secretary to Government of Bengal on the subject for your information. The locality of the copper ores of Pushak is at an elevation of 2,000 to 2,500 feet above the level of the sea. The rocky belt containing the ore runs generally east and west. There is a deposit of tufa lime close to one of the copper veins.

A. CAMPBELL,

Superintendent.

Supt. Office, Darjeeling, the 7th January, 1854.

No. 43 of 1854.

To

CECIL BEADON, ESQ.,

Secy. to Govt. of Bengal, Fort William,

Dated Darjeeling, 7th January, 1854.

SIR,

I have much satisfaction in reporting for the information of Government that copper has been discovered in a portion of the hill territory attached to Darjeeling.

2. The existence of the ore was first brought to my notice by Rajiman, a pensioned sepoy of the local Sappers, to whom a specimen was brought by a Nepalese miner named Bulthamme Singh who had been employed in the vicinity in digging out a deposit of tufa lime. This man's acquaintance with the copper-yielding rocks in Nepal led him to examine similar formations here, and the result was the discovery of the ore.

3. I forwarded specimens of the ore and of the copper extracted from it to Mr. Piddington at the Asiatic Society's Museum ten days ago for examination, and I last night returned from a personal examination of the locality.

4. The district of Pushak, twenty miles road distance from Darjeeling, is the locality. I visited four different places in which the ore exists, had some dug out of each, and had a portion smelted in my presence by a party of Nepalese smelters, whom I had sent to the spot.

5. I have left a party of men to dig out more of the ore, and have employed the discoverer of it to make further search for other veins on the pay of ten rupees for one month with two attendants at four each. I have disbursed ten in presents to the people who have been employed, and I propose with the sanction of Government as a preliminary means of ascertaining the value of the ore, its extent, and distribution to expend not more than 100 Rs. after which I shall make a further report on the subject.

6. I have also to report that I have got specimens of copper ore from the Sikim territory adjacent to our territory but not in the same direction as Pushak.

7. If these ores of Pushak turn out at all equal in richness to the copper mines of Dunkoota in Nepal, this discovery will be very important one.

8. I have publicly intimated that copper ore wherever found in our territory under my controul is the property of Government. This is in

accordance to the original rules for the management of the Darjeeling tract when ceded to the British Government, and published in 1839.

I have, &c.

(Signed) A. CAMPBELL,
Superintendent.

Supt. Office, Darjeeling, the 7th January, 1854.

(True Copy).

(Signed) A. CAMPBELL,
Superintendent.

No. 52 of 1854.

To

H. PIDDINGTON, Esq.

*Curator Museum of Economic Geology,
Asiatic Society, Calcutta.*

SIR,

On the 7th instant I had the pleasure to send you by dák No. 3 specimen of copper ore from Pushak in the Darjeeling territory. It was taken from a different place from No. 2, that is to say, it was from the same spur of the Pushak hill but 2 or 300 feet lower down, and close to a stream of water.

2. I have now the pleasure to send you a specimen No. 4, which I believe to be also a copper ore; it comes however from a different locality, but still in the neighbourhood of Pushak, and in the British territory. It was found at "Mungwah" a mountain spur to the south of Pushak. When fresh from the earth it was of an apple-green colour, portions of it are friable, with a golden tinge, and the crystallized structure of it is quite apparent. It was found about four feet below the surface. The top soil was red and yellow which attracted the attention of the searching party, and induced them to dig. I shall be glad to hear if it is a copper ore, and if you require more of it for examination, I shall send it to you. Call it the Mungwah specimen in alluding to it.

3. I have about 4 lbs. of metallic copper which has been obtained from the ore sent to you as No. 3, the ore was not weighed, but it is reckoned that about 80lbs. was used to obtain the above quantity of metal. This is a poor return, but the Nepalese smelters who are with me say that the poverty of a copper ore on the surface, is, in the Nepal mines no guide at all to the quality of the interior veins. I have got now about three maunds of the ore, which I purpose having weighed and carefully reduced,

you shall be informed of the result. As I took memoranda of the smelting process by the party I had with me at Pushak, I can let you have it also.

(Signed) A. CAMPBELL,
Superintendent.

Supt. Office, Darjeeling, the 17th January, 1854.

In a private reply to Dr. Campbell, requesting a better supply of the ores to enable me to take a fair average specimen (which is always a matter of great importance in pronouncing on the mineral value of ores in a commercial point of view) I have informed him as the results of my first, cursory, examination only, that—

No. 1. The Chakoong ore is a good Sulphuret of Copper (Copper pyrites) with Silica.

No. 2. The ore from Pushak is a Hornblendic schist with Copper pyrites and perhaps also Bismuth.

No. 3. Which is the only specimen which has a label, is marked as a "Carbonated Exudation." It is, I think, an earthy variety of the rare mineral Bismuthite or Carbonate of Bismuth, coloured in places by copper; but we have but a few water-worn and sintery fragments, and all we can say at present from the minute portion we can afford for examination is, that it is principally carbonate of Bismuth.

No. 4. Dr. Campbell's Mungwah ore is of no value; being only Hornblende and Tremolite (a variety of Hornblende) coloured by the decomposition of the common Hornblende.

The specimen of smelted copper sent is tolerably good, but somewhat brittle, from a portion of the Bismuth and Sulphur still remaining in it, I have told Dr. Campbell that he should make his native smelters roast their ores carefully before smelting which I believe they never do,* and that this will much improve the quality of his copper as well as its quantity, since there will be less copper, "burnt" as it is termed, i. e. evaporated in the smelting.

This discovery of copper ore at Darjeeling is remarkable in a geological point of view, inasmuch as it lies on the great north-east and south-west line, from Parisnath as a centre, on which so many localities of copper and other ores have been discovered, and on which I may add more are known, though their localities are not yet made public.

I have obtained by accident at the jail where it had been brought with the ballast for stone breaking! some very fine specimens of anthracite and

* Dr. Campbell informs me in reply that they do roast their ores; whether properly or not, is another question.

its sandstone, which I take to be American? These fine specimens are well worth adding to our stock of the mineral.

Report of Curator, Zoological Department, October Meeting, 1853.

A few specimens only have been added to the Society's collections during the past month; but these few comprise several species of interest, and some new to our museum.

1. Dr. Fayrer. A bottle of sundries from Rangoon. Among them is the COLUBER KORROS, Reinw., juv.,—HOMOLOPSIS HYDRINA, Cantor,—ELAPS MELANURUS, and a few *Arachnidæ* and *Termites*.

2. Capt. Haughton, Chaiebasa. Also two bottles of sundries, among which are EUBLEPHARIS HARDWICKII, Gray (*Gymnodactylus lunatus*, nobis, noticed in XVI, 633), HEMIDACTYLUS COCTEI, ONYCHOCEPHALUS ACUTUS (very rare and highly acceptable), BOA CONICA, HELIX (affined to *H. INSCULPTA*, Benson), numerous Scorpions and Tarantulas, and some marine shells (BUCCINUM and IANTHINA), and Barnacles.

3. Dr. Kelaart, Colombo. A specimen of CYLINDROPHIS MACULATA and two bottles of marine fishes, the latter to be examined and returned.

4. Lt. Roberts, 7th Madras Cavalry. A young specimen of EMYS DHONGHOKA, Gray, picked up near Saugor in Central India; and a few marine shells from the Indian Ocean, comprising a fine CERITHIUM that we did not possess previously.

E. BLYTH.

November Meeting, 1853.

The contributions to our museum for the past month are as follow:

1. Babu Rajendra Mallika. A very large and fine male specimen of the Binturong (ARCTICTIS BINTURONG, Tem.; *Ictides ater*, Valenciennes), both skin and skeleton of which have been prepared.* Also the carcass

* This animal belonged to the Society, and was presented by Capt. Phayre, as noticed in my Report for July, 1847, *J. A. S.* XVI, 864: the Babu having long kept it for us in his menagerie. It continued tame to the last, but was less trustworthy from the time it had been pent up in confinement. The species is remarkable for being the only placental mammal of the Old World, or major continent, which is furnished with a truly prehensile tail: certain PARADOXURI only, to my knowledge, exhibiting even a slight degree of prehensiveness in that organ; unless the Pangolins (MANIS) may also be said to shew some power of the kind. No Old

of a doe *Bara Singha* Deer, (*CERVUS DUVAUCELEI*, F. Cuv., v. *C. elaphoides*, Hodgson.) A Wood Partridge (*PERDIX GULARIS*, Tem.): a Lory new to the museum (*EOS GUEBIENSIS*); and a young specimen of the great Indian Crane or *Sarrus* (*GRUS ANTIGONE*), with feathered head and neck, as seen likewise in young Turkeys, Guinea-fowls, and most other birds of which the necks are bare of feathers in the adult.

2. From the Barrackpore Menagerie. An adult male Monkey (*MACACUS CYNOMOLGOS*), since prepared as a skeleton; a fine adult female Nilgai (*PORTAX PICTUS*); and a Pelican Ibis (*TANLATUS LEUCOCEPHALUS*).

3. J. W. Payter, Esq., Jeypore. A skin of a Bat (*KERIVOULA PICTA*), identical in species with examples from Java, Ceylon, and the vicinity of Dacca.

E. BLYTH.

P. S.—I shall here append a short note to my paper on the Orang-utan genus, Vol. XXII, p. 369 *et seq.*

Prof. Owen, to whom I had sent sketches of the skulls of (adult females of) the four presumed species, writes word—"that my *S. WURMBII* and *S. ABELII* are one species does not surprise me: I have always wanted further evidence of their relations. That the female skulls, of which you sent me outlines, of *Mias Pappan* and *M. Rambi* belong to distinct species, would be very probable, were the character from nasal bones constant. I do not place so much stress on the parietal ridge or ridges, seeing the difference in the wear of the canine teeth in the two drawings."

Prof. Owen here evidently conjectures that the parietal ridges might approximate and finally unite with age: but a glance at the actual specimen figured would, I feel satisfied, convince any competent observer to the

World *Quadrumana*, like *MYCETES*, *ATELES*, *CEBUS*, and affined forms of *S. America*; nor *RODENTIA*, like the American Prehensile-tailed Porcupines and affined genera: and again, even among the *EDENTATA* of the same continent, the same power is shewn by the little Ant-eater. In the Kinkajou (*CERCOLEPTES*), a *S. American* genus not distantly affined to the Binturong, the prehensile power of the tail is much less perfect, as I can aver from personal observation of both animals. It is again completely exhibited by various marsupial genera, as the Opossums of America, and the Phalangiers of Australia, N. Guinea, the Philippines and Moluccas. Among reptiles, in the Chamæleons and arboreal Snakes; and among fishes, in the *HIEPOCAMPI*. The plumed tail of many birds is made to serve as an effective *prop* in climbing, as familiarly exemplified by the Woodpeckers and Tree-creepers, certain Swifts, and even by all the *PELICANIDÆ* in a remarkable degree (as I have witnessed in Cormorants, Anhingas, Gannets, and Phætons or 'Tropic-birds').

contrary. Besides, quite a young male *Rambi* now belonging to Capt. S. R. Tickell, not $\frac{1}{3}$ grown during the time that I took care of it for him, had already a conspicuously developed single sagittal crest, with the lamdoidal ridges uniting to form it equally strongly marked, as seen in the living animal. Then, as before related, I have seen and attentively examined a living full grown female *Rambi*, which exhibited no sign of the facial callosities which exist in both sexes of the *Pappan*: and we possess the stuffed skin of a more than $\frac{1}{3}$ grown male *Rambi*, which also shews no trace of these callosities; whereas Sir J. Brooke states, that some young *Pappans* which he had shipped “(one of them not a year old, with two false molars,) shew them prominently.”

I have lately also received a communication from Sir J. Brooke, wherein he states, that—“A gentleman with me killed about a year ago a female Orang measuring from head to heel 5 ft.; and she was said to be small in comparison with a male before killed by a Malay. This female Orang had large cheek callosities.”

Prof. Owen continues—“The short-armed species can hardly be a variety of *MORIO*; and one other instance of the curtailed development of the *radius* would quite satisfy me, other characters accompanying it, of this extremely interesting addition to the catalogue of anthropoid apes.”
—E. B.

February, 1854.

Our accessions to the Museum for the last three months are as follow:

1. M. Alfred Malherbe, Metz. A fine collection chiefly of bird-skins, with some mammalia and reptiles, from Europe and N. Africa (Algiers). Among the mammalia are *RHINOLOPHUS UNIHASTATUS*, *SCOTOPHILUS SEROTINUS*, and *PLECOTUS AURITUS*: *MYOXUS GLIS*; and a small Shrew sent in spirit as *CROCIDURA LEUCODON*, but which appears to be merely the common *CORSIRA VULGARIS* (v. *Sorex tetragonurus*, &c.)

Of birds, the most acceptable are *ERYTHROPUS VESPERTINUS* (particularly fine male); *ATHENE PSILODACTYLA*, (L., v. *noctua*, Retz., nec Tem.), from Algeria; *LANIUS MERIDIONALIS*, Algiers; *RUTICILLA TITHYS*, mas.; *CYANEULA* (with white breast-spot); *ANTHUS AQUATICUS* (*verus*); *BUDYTES NEGLECTA*; *MONTIFRINGILLA NIVALIS*;* *HERODIAS VERBANY*

* Type of *MONTIFRINGILLA*, Brehm; and differing only from restricted *FRINGILLA* (as exemplified by the British Chaffinch and Bramblefinch, and the somewhat aberrant Himalayan *FR. BURTONI*,—*Carduelis Burtoni*, Gould, *Fr. erythrophrys*, nobis), by its longer wings and somewhat broader tail,—therein approximating the

(somewhat smaller and shorter-billed than *H. BUBULCUS*, but barely separable from the latter); *CICONIA NIGRA*, juv.; *CYGNUS MUSICUS*; and *PHALACROCORAX PYGMÆUS* from Algiers, sent as *Ph. africanus*, but perfectly identical with the common small Cormorant of India. Many other fine specimens are sent, but of species with which we were previously well supplied.

Of reptiles, *RANA ESCULENTA*, *SALAMANDRA MACULOSA*, Laurenti, and *LISSOTRITON PALMATUS*, (Daud., nec *L. PALMIPES*.)

Northern Snowflea (*PLECTROPHANES*),—from which, indeed, it hardly differs more than *EMBERIZA PYRRHULOIDES*, Pallas, does from *EMB. SCHÆNICULUS*, which some ornithologists now consider to be merely varieties of the same species. We have observed the Snowflea (*PLECTROPHANES NIVALIS*) alive, and kept it long in confinement; and we consider its affinity to be, decidedly, with the true *FRINGILLÆ*, and not with the *EMBERIZÆ*, to which it has generally been approximated. On the other hand, we would separate the long-winged ground Linnets (*LEUCOSTICTE*, Swainson), two or three Asiatic species of which (including *FRINGILLAUDA NEMORICOLA*, Hodgson, are assigned to *MONTIFRINGILLA* by Mr. Gould, unhesitatingly from the latter group, and adopt for them Mr. Swainson's name *LEUCOSTICTE*. Nearly affined, but on a larger scale, with longer bill having a slightly curved upper outline, and less elongated wings, there is the *PYRRHOSPIZA PUNICEA*, Hodgson, nobis (*Propyrrhula rubeculoides*, Hodgson); and other forms are akin, somewhat difficult to classify. The Himalayan red Finches known to me are as follow. 1. Restricted *PYRRHULA*, the true Bullfinches. Two species, *P. NIPALENSIS*, Hodgson, and *P. ERYTHROCEPHALUS*, Vigors. 2. *PYRRHULOIDES EPAULETTA*, (Hodgson). 3. *PROPYRRHULA SUBHEMACHALANA*, (Hodgson). Combines the beak of *PYRRHULA*, scarcely less broad, with the plumage of *STROBILOPHAGA* (*Corythus*) and *LOXIA*; only softer, and the wings are shorter and more rounded. *STROBILOPHAGA* leads from this to No. 4, *LOXIA*; of which a peculiar species exists in *L. HIMALAYENSIS*, Hodgson, as much smaller and weaker than *L. CURVIROSTRA* as *L. PYTIOPSITTACUS* is larger and stouter. *L. CURVIROSTRIS* I have seen alive from Afghanistan. Then we must interpolate the (5) *HÆMATOSPIZA SEPAHI*, Hodgson, nobis; and after this may follow the (6) *CARPODACI*, viz. *C. RUBICILLA*, (Gould, v. *Coccothraustes caucasicus*, Pallas), from Kashmir, &c.—*C. RODOCHLAMYS*, (Brandt, v. *C. sophia*, Bonap., and *C. grandis*, nobis,)—and the common Indian *Tuti*, which I have much reason to doubt is identical with the northern *C. ERYTHRINA*. 7. Next follows a group to which the N. American *C. PURPUREUS* seems to lead, with less tumid bill, and the plumage of the males more or less of a vinaceous red colour. *PHÆNICOSPIZA*, nobis; two Himalayan species, *PH. RODOPEPLA*, (Vig.), and *PH. RODOCHROA*, Vigors. 8. Hardly separable from the last except by its more slender bill, follows the *PROCARDUELIS NIPALENSIS*, Hodgson: and then we have *PYR-*

2. L. C. Stewart, Esq. now of H. M. 61st Regt., Wuzeerabad. Selections, from two collections, of such specimens as were required for the museum; their place to be supplied by examples of various Bengal and other species, not required by the Society.

From a small collection, chiefly of birds, procured in the Madras Presidency, we have obtained a good skin of *SCIURUS MACROURUS*, Forster, shot near Bangalore, and precisely identical with Ceylon specimens: long ago we received on loan a Travancore example of this species from Mr. Walter Elliot; and we possess a bad skin of it from the Nilgiris: so that its occurrence on the mainland of India is now thoroughly established. Also horns of both sexes of the so called Nilgiri Ibex (*KEMAS HYLOCRIUS*, Ogilby), the representative in the Nilgiris of the *Tehr* or *Jharal* of the Himalaya (*K. JEMLAICUS*). Of birds, the rare *PARUS NUCHALIS*, Jerdon, from a tope near Bangalore; and a specimen in winter dress, shot near Madras, of *LOBIPES HYPERBOREUS*, (L.)! It is the first instance recorded of the occurrence of this arctic or sub-arctic (and even rare British) species in India, where it can only be considered as an exceedingly rare and accidental straggler; and only one instance is known of the occurrence of the affined *PHALAROPUS FULICARIUS*, (L.), in India,—a specimen *in winter dress*, and very lean, but with the plumage in fine order, having been procured by myself in the Calcutta provision bazar, brought with Snipes, &c., on May 11th, 1846.

Mr. Stewart's second collection is a most extensive one, procured chiefly in the vicinity of Landour, and in the Deyra Doon. We derive from it several skulls of mammalia, including that of an adult male *Langur*, *PRESEBYTIS SCHISTACEUS*, Hodgson, considerably larger than (and well distinguished from) those of adult males of the Bengal *Hunuman*, *PR. ENTELLUS*; also a fine skull of a *Chiru*, *PANTHALOPS HODGSONII*.

RHOSPIZA PUNICEA (scarcely separable from the last, generically), and the *LEUCOSTICTE* group, followed by the European Linnets and Redpoles, Siskins and Greenfinches, Serins, Goldfinches, &c.; the typical red plumage passing into green and yellow,—and finally the various forms of true Fringilline Grosbeak, and the Chaffinches, Snowfinch, and northern Snowfleck, which last (as aforesaid) has no immediate affinity for the *EMBERIZINÆ*, nor has the Alpine Snowfinch (*MONTIFRINGILLA NIVALIS*) for *LEUCOSTICTE*. It is remarkable that the Chaffinches (restricted *FRINGILLA*) are partly insectivorous, and feed their young with insects; as the Sparrows also do: whereas the Linnets, Greenfinches and affined forms (of which the domestic Canary may be considered typical,) rear their young upon macerated vegetable diet ejected from the craw or dilatation of the *oesophagus*, and appear never to touch insect-food of any kind.

Of skins of mammalia, *VULPES MONTANUS*, very fine; *PARADOXURUS GRAYI* (*P. nipalensis*, Hodgson); and two of *MUSTELA SUBHEMACHALANA*, Hodgson.*

Among the birds, a noble *AQUILA CHRYSÆTOS*, fully mature; *BUTEO VULGARIS* (*rufiventer*, Jerdon)†; *CIRCUS CYANEUS*, fine ashy male; *KETU-PA FLAVIPES*, (Hodgson), young; *HEMILOPHUS PULVERULENTUS*, from the Deyra Doon (three specimens obtained; we previously possessed this largest of Asiatic woodpeckers, an inhabitant chiefly of the Malayan peninsula, from Arakan, and had been assured that it had been seen and recognised at Darjiling; and few Woodpeckers would be more easy to recognise even at a distance, from its great size and very peculiar colour); *TIGA SHOREI*, m. and f.; *CYPSELUS LEUCONYX* (the N. W. Himalaya appears to be the main habitat of this species, which rarely strays so far as Bengal or S. India; it is distinguished from the nearly affined *C. VITTATUS* of the Malay countries and China by its smaller size and proportionally smaller feet, the claws of which are commonly but not always white or whitish); *PARUS MODESTUS* (*Sylviparus modestus*, Eyton, v. *P. sericophrys*, Hodgson); *EUSPIZA FUCATA* (apparently not uncommon, and seeming an irregular and uncertain winter visitant in Lower Bengal); *EU. STEWARTI*, n. s.;‡ *ACCENTOR VARIEGATUS*, nobis, several; *ALAUDA LEIOPUS*, Hodgson;§ *ANTHUS CERVINUS*, fine; *GRANDALA CÆLICOLOR*;

* The museum is ill supplied with skins of the Himalayan true *MUSTELÆ*.

† There are five unmistakeable skins of this species; and it seems now that this is the ordinary hill or rather mountain Buzzard of India, replaced by *B. RUFINUS* on the plains: the latter is larger, and varies much less in the colours of its plumage, than the other.

‡ *EUSPIZA STEWARTI*, nobis. Affined to *EU. CÆSIA* (Cretsch.) Length about $5\frac{1}{2}$ in.; of wing 3 to $3\frac{1}{4}$ in.; and tail $2\frac{1}{2}$ in. Crown and front of neck ashy; the ear-coverts and upper-parts of breast albescent-ashy; throat and supercilia black, the feathers of the former margined with whitish towards the chin; lower half of breast, flanks partly, nape, back, rump, upper tail-coverts, and fore-part of wings, deep-ferruginous approaching to maronne, the feathers more or less bordered paler: rest of wings dusky, the feathers margined with brown; and belly and lower tail-coverts buffy-white; tail having its outermost feather $\frac{2}{3}$ white, and the next $\frac{1}{2}$ white. A younger male, or seemingly shot earlier in the breeding season, has the fore-part of the wing less rufous, the pale margins to the feathers generally rather more developed, and slight central dusky spots on those of the back.

§ *ALAUDA LEIOPUS*, Hodgson. Absolutely resembles the British Sky Lark (*A. ARVENSIS*, v. *dulcivox*, Hodgson), except in being smaller. Length of wing $3\frac{1}{2}$ to $3\frac{3}{4}$ in., and of tail $2\frac{1}{4}$ in. This species was long ago sent to the museum by

RUTICILLA ERYTHROGASTRA, (Guld., v. *R. tricolor*, Gould; this fine and very rare Himalayan bird was obtained by a mountain stream near Landour,—there were a pair of them, apparently alike in colour); TARSIGER CHRYSÆUS, H.; CYORNIS ŒQUALICAUDA, nobis, *J. A. S.* XX, 523, another female (the male being still unknown*); PHYLLOPNEUSTE OCCIPITALIS, two (previously only known from a single specimen procured in S. India by Mr. Jerdon); REGULOIDES CHLORONOTUS; HOUBARA MACQUEENII; LOBIVANELLUS LEUCURUS (the only Indian specimen previously recorded having been obtained by myself in the Calcutta bazar); PORZANA AKOOL (Deyra Doon); P. ZEYLONICUS, Ind. var. (resembling a specimen from Gumsur, and in like way differing from a Cinghalese one, vide *J. A. S.* XXI, 353; also Deyra Doon); and some others unworthy of particular note. Three specimens of an Egret in winter dress would seem to differ only from ordinary HERODIAS GARZETTA in having black toes.

T. C. Jerdon, Esq., Mhow. A few bird-skins from the vicinity of that station; of which the most remarkable is an example of LOCUSTELLA RAYI, nobis, the British Grasshopper Warbler, which would appear to be there not uncommon. We had previously seen a specimen from the N. W. Himalaya.† Also CHÆTUSIA GREGARIA (mistaken in Mr. Jerdon's Cata-

Mr. Hodgson from Nepal; but the specimens were in such bad order that I could not satisfactorily distinguish them from A. GULGULA (the common Lark of the plains of India and of Bengal). From the latter it may be distinguished, however, by its smaller bill and longer tail. N. B. The supposed M. MALABARICA, Scopoli (*A. deva*, Sykes), of my Catalogue of the Birds in the Society's museum, I now believe to be merely A. GULGULA in much abraded plumage.

* Qu. C. PALLIPES, (Jerdon) ?

† I believe that I first termed this species L. RAYI, some fifteen years ago, and Mr. Gould adopts this name for it in his 'Birds of Europe.' Mr. G. R. Gray terms it LOCUSTELLA AVICULA, Ray; but the latter word was assuredly never meant for a name or specific designation. M. Degland styles it L. NÆVIA, from its being the *Curruca grisea nævia* of Brisson, and gives *L. Rayi*, "Gould," as a synonyme; but this I think is hardly admissible. A second species is not rare in the vicinity of Calcutta during the cold season, especially about the Salt-water Lake, where it is often taken alive and brought to the provision bazar, along with the various small Rails and Water-Crakes; but such specimens are generally mutilated by the dealers, who tear off the quills of one wing and often the tail with it, according to their vile wont. I now suspect that this second true and typical species of LOCUSTELLA (my L. RUBESCENS, *J. A. S.* XIV, 582), is no other than the *Turdus certhiola*, Pallas (*Sylvia c.*, Tem.), from N. Asia, and so very rare in collections. DUMETICOLA THORACICA, nobis (*Salicaria affinis*, Hodgson), appears to approximate the European LOCUSTELLA FLUVIATILIS, (Meyer); and TRIBURA

logue of the birds of the peninsula of India for *HOPLOPTERUS VENTRALIS*),

A. Campbell, Esq, Darjiling. Imperfect skin of a young fawn of the *Shou*, or Tibetan Stag (*CERVUS WALLICHII*); as also an imperfect skin of a half grown *Shou*, asserted to be of a distinct and peculiar species by Dr. Campbell's native informant. We do not hesitate to refer both to the *Shou*; and may remark that the fawn skin is very much speckled or *menilled* with white, much more so than a new-born fawn of the *Wapiti* Stag (*C. CANADENSIS*), which we saw alive.* Also the skin of a reptile (*HYDROSAURUS SALVATOR*).

E. F. Kelaart, Esq. M. D., Ceylon Medical Service, Galle. Series of horns of *AXIS ORYZEUS*, Kelaart, of three ages. We are unable to distinguish them from the horns of *A. PORCINUS*, or the Hog Deer of the Gangetic provinces and of Burma; which species may possibly have been introduced into Ceylon, though unknown in the peninsula of India.† The Hog Deer of the Indus territories is distinct (*CERVUS DODUR*, Royle); and of this we have no specimens in our museum. Dr. Kelaart has also forwarded some reptiles, but they have not yet come to hand.

W. Bracken, Esq. C. S. Skin of a *Likh* (*SYMPHEOTIDES AURITUS*), termed *Floriken* in S. India; shot near Calcutta.

J. Swarris. Skin of a Leopard Cat (*FELIS BENGALENSIS*), shot near the light-house on Saugor Point; an unexpected locality for the species.

C. A. Jones, Esq. A dead Cockatoo (*CACATUA GALERITA*), which had "lived above forty years in the family."

J. Barlas, Esq., Rangoon. Specimen of a well known moth, from Burma, *PH. PATROCLUS*, L. (Cramer, pl. CIX, *a*, *b*.): a splendid species common in collections from China, Asám, Sylhet, and Arakan.

LUTEOVENTRIS, Hodgson, placed by me dubiously as a *PSEUDOLUSCINIA*, Bonap., may even prove to be the European *Ps. SAVII*, Bonap. (*Sylvia luscinoides*, Savi); but our specimens of these two Himalayan birds are very bad, and we can therefore arrive at no satisfactory conclusion from comparing of them with descriptions taken from fine and perfect specimens.—Since the foregoing note was written, we have received a Bengal specimen of *LOCUSTELLA RAYI*.

* We have been assured that the Stag of Kashmir, though in general bearing a simply bifurcating crown, as in the Tibetan specimens hitherto examined, yet has been seen with as many as 18 points in all, and that 12 and 14 are not very uncommon. We trust soon to have the opportunity of comparing Tibetan and Kashmirian specimens.

† Dr. Kelaart has since forwarded a living adult male; and the species is exactly intermediate to the *AXIS MACULATUS* and *A. PORCINUS* of Bengal, in form (including horns), size, and colouring.

P. S.—From seeing the fourth number of Gould's 'Birds of Asia,' I find that the fragments of a large *CARPODACUS* from Kashmir, noticed in *J. A. S.* XXII, 583, pertain to a specimen of *C. RUBICILLA*, (Brandt, v. *Coccothraustes caucasicus*, Pallas); also that my *C. grandis*, *J. A. S.* XVIII, 810, from the Tyne range beyond Simla, = *C. RODOCHLAMYS* (Brandt, v. *C. sophia*, Bonap. and Schlegel). The difference in the brightness of colouring of Mr. Gould's male specimens of *C. RUBICILLA* from different localities is merely seasonal, and exactly corresponds with what I have observed of the common Indian species, currently referred to *C. ERYTHRINUS*. No. 938 of my Catalogue of Birds in the Society's museum is correctly identified; but the earliest name for the species is *TURDUS FUSCATUS*, Pallas. Of *T. RUFICOLLIS*, Pallas, Mr. Gould mentions the suspicion that it is merely a variety of *T. ATROGULARIS*, Natterer; and states that he had "never seen a specimen of the latter species with any other than blackish-brown tail-feathers; if I had," he adds, "I should have become a convert to the opinion of those who consider the two birds to constitute but a single species." Had he turned to my Catalogue, however, which he quotes, he would have found it stated of *T. RUFICOLLIS*, that it is "perhaps a variety of *T. ATROGULARIS*, of which some specimens are partially rufous-tailed." We have such in our museum. I strongly suspect, also, that *MERULA CASTANEA*, Gould, is an analogous variety of *M. ALBOCINCTA*, (Royle); and *GEOCICHLA DISSIMILIS*, nobis, of *G. UNICOLOR*.* No. 1465 of the same Catalogue is *EUPLOCOMUS VIEILLOTI*, (G. R. Gray); distinct, it now appears, from *EU. IGNITUS*. Mr. Gould

* In a letter just opportunely received from Capt. Thos. Hutton, that observer writes—"I incline now to think that *MERULA CASTANEA* is distinct from *M. ALBOCINCTA*, on account of difference of habit; the former is in large parties, the latter always single and solitary. *TURDUS RUFICOLLIS* I do not know in these parts; but *T. ATROGULARIS* is abundant here in winter and also in Afghanistan. *GEOCICHLA DISSIMILIS* and *UNICOLOR* may probably be the same, though I think not, as I have never seen a bird answering to your description of the former."

The same gentleman adds, in reply to another enquiry of mine,—“I never saw *CORVUS CORAX* in all my wanderings, nor yet in any collection made in the hills; and have no faith in its existence in these parts.” So Mr. Hodgson also lately assured me, that he had never heard of it to the southward of the snowy ranges, though common in Tibet. But in a letter just received from Mr. L. C. Stewart, now at Wuzzeerabad, that observer writes—"CORVUS CORAX abounds, and is as impudent and familiar as *C. SPLENDENS*. He seems to replace *C. CULMINATUS*, as I have not seen one of the latter. There can be no mistake, for he is as big as a half-grown Turkey." A specimen would be very acceptable from that locality.

has coloured the cere and feet of our common Indian Kite of too deep a yellow. In his opinion, this bird and the *MILVUS ATER* of Europe and the *M. AFFINIS* of Australia “form three very distinct species, of which the [Indian] *M. GOVINDA* is by far the largest and finest.” Their distinctive characters, however, are not pointed out. *MUSCIPETA INCEI*, Gould, from the neighbourhood of Shanghai, is nearly related to my *M. AFFINIS* from the Malay countries, &c.; but seems distinct. A beautiful *SUTHORA* is figured, from China, distinct from the four N. Indian species (*RUFICEPS*, *FULVIFRONS*, *NIPALENSIS*, AND *POLIOTIS*),—*S. WEBBIANA*, G. R. Gray; and two varieties are represented of *S. NIPALENSIS*, Hodgson,—one with dark ashy crown, and white checks passing into pale ashy posteriorly (not my *S. POLIOTIS*, *J. A. S. XX*, p. 32, from the Khásya hills),—the other with rufous crown and ear-coverts, and an ashy mark behind the latter,—possibly a sexual distinction. This should be investigated by any ornithologist who has the opportunity.—E. B.

LIBRARY.

The following additions have been made to the Library since December last.

PRESENTED.

Sanskrit-Wörterbuch herausgegeben von der Kaiserlichen Akademie der Wissenschaften. Bearbeitet von Otto Böhtlingk und Rudolph Roth. Erste Lieferung, St. Petersburg 1853, 4to.—BY THE EDITORS.

Selections from the Records of the Government of India No. II. Punjab Report. No. III. Sir C. Napier's Resignation.—BY THE GOVT. OF INDIA.

Selections from the Records of the Government of Bengal No. XIII. Notes on the manufacture of Salt in the Tumlook Agency, &c. 2 copies.—BY THE GOVT. OF BENGAL.

Journal of the Indian Archipelago for April and May, 1853.—BY THE SAME.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Mathematisch Naturwissenschaftliche Classe. Band X. IV. und V. heft.—BY THE VIENNA ACADEMY.

Ditto ditto Philosophisch-Historischen Classe. Band X. IV. heft.—BY THE SAME.

Annales de l'Academie d'Archéologie de Belgique. Tome VI. 3me Livraison. Tome VII. Tome VIII. 1er. Livraison et Tome X. 2me Livraison.—BY THE ACADEMY.

Statuts de l'Ordre Chapitral d'Ancienne Noblesse des quatres empereurs d'Allemagne. Anvers 1838. Pamphlet.—BY THE SAME.

Memoire sur la Noblesse et les moyens de la Relever ; accompagné de quelques réflexions concernant l'impôt que l'on propose d'établir sur les concessions Nobiliares. Anvers 1849. Pamphlet.—BY THE SAME.

Recueil des Actes de l'Académie des Sciences, Belles-lettres et arts de Bordeaux, 2e, 3e et 4e trimestres des 1852, et 1er Trimestre de 1853.—BY THE ACADEMY.

Observations made at the Magnetical and Meteorological Observatory at Toronto in Canada, printed under the superintendence of Col. E. Sabine. Vol. II. 1843-5.—BY THE BRITISH GOVERNMENT.

Transactions of the Royal Society of Edinburgh vol. XX. pt. IV.—BY THE SOCIETY.

Proceedings of the Royal Society of Edinburgh. Sessions 1852-3.—BY THE SAME.

The white Yajur Veda, edited by Albrecht Weber. Part II. Nos. 2, 3.—BY THE EDITOR.

Memoirs of the Royal Astronomical Society, vol. XXI.—BY THE SOCIETY.

Monthly Notices of the Royal Astronomical Society, vol. XII.—BY THE SOCIETY.

Tidschrift voor Indische Taal, Landen Volkenkunde, nitgegeven door het Bataviaasch Genootschap van kunsten en Wetenschappen. Jhargang I. Aflevering I. II. III. and IV.—BY THE BATAVIAN SOCIETY OF SCIENCES.

Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen, vols XX. to XXIV.—BY THE SAME.

A Narrative of the Insurrection which happened in the Zemindary of Banares in the month of August 1781.—BY THE GOVERNMENT OF THE N. W. PROVINCES.

Derde Bijdrage tot de kennis der Ichthyologische Fauna van Ceram, Door Dr. P. Bleeker.—BY THE AUTHOR.

Verslag von de Vergadeomy des Naturskundize Vereeniging in Nederlandsch Indie Gebouden den 9 den November 1853.—BY THE SAME.

Vierde Bijdrage tot de kennis der Ichthyologische Fauna van Amboina, Door Dr. P. Bleeker.—BY THE SAME.

Nalezingen Vop de Ichthyologische Fauna van het Eiland Banka, Door Dr. P. Bleeker.—BY THE SAME.

Vierde Bijdrage tot de Kennis der Ichthyologische Fauna van Celebes, Door Dr. P. Bleeker.—BY THE SAME.

Overzicht der Geschiedenis van het Bataviaasch Genootschap von kunsten en Wetenschappen von 1778—1853—Door Dr. P. Bleeker.—BY THE SAME.

Bijdrage tot de Kennis der Troskienwige Visschen von der Indischen Archipel, Door Dr. P. Bleeker.—BY THE SAME.

Zeitschrift der Deutschen Morgenländischen Gesellschaft. Achtes Band I heft.—BY THE SOCIETY.

The Quarterly Journal of the Geological Society, vol. IX. pt. IV.—BY THE SOCIETY.

Bulleten de la Societé de Géographie, 4me serie, Tome V.—BY THE SOCIETY.

Journal of the American Oriental Society, fourth volume, No. I.—BY THE SOCIETY.

Upadeshak, No. 85.—BY THE EDITOR.

The Oriental Christian Spectator, November and December, 1853.—BY THE EDITOR.

The Oriental Baptist, No. 85.—BY THE EDITOR.

The Calcutta Christian Observer for January, 1854.—BY THE EDITOR.

Journal of the Agricultural and Horticultural Society of India, vol. VIII. p. 4.—BY THE SOCIETY.

Bibidhārtha Saṅgraha, No. 23.—BY THE EDITOR.

The Citizen, for December and January last.—BY THE EDITOR.

Purnachandrodaya, Newspaper, for January, 1854.—BY THE EDITOR.

Exchanged.

Jameson's Journal, No. 110.

The Athenæum, for October, 1853.

The Philosophical Magazine, Nos. 39, 40.

Purchased.

The Edinburgh Review, No. 200.

Journal des Savants, for September, 1853.

Comptes Rendus, Nos. 11 to 17.

The Annals and Magazine of Natural History for Oct. and Nov. 1853.

Ibn el Athiri Chronicon quod perfectissimum inscribitur, 2 vols.

RA'JENDRALA'L MITTRA.

Feb. 1st, 1854.

FOR MARCH, 1854.

At a meeting of the Asiatic Society held on the 1st inst. at the usual hour,

C. Allen, Esq., Senior Member of the Council present, in the Chair.

The minutes of the preceding month were read and confirmed.

Presentations were received —

1. From E. C. Colebrooke, Esq. Reports of Summary Cases determined in the Sudder Court, during 1849—52.

2. From the Government of Fort St. George through the Chief Secretary Sir H. Montgomery, Reports of the Madras Central Museum, for 1853.

3. From Lady Elliot, a complete copy of Rees's Cyclopædia in 43 volumes.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected ordinary members.

Major M. E. Loftie, 30th Regt. N. I.

Lt. W. Hichens, Bengal Engrs.

C. E. Chapman, Esq. B. C. S.

Notes were recorded from Mr. Earle and Bábu Gyanendramohun Tagore, expressing their wishes to withdraw from the Society.

Pursuant to notice given at the last meeting Mr. Houstoun desired "to know under what decision of the members assembled in general meeting letter No. 217 of the 3rd December, 1853, was written, and made to appear as if the act and deed of the Society."

The chairman pointed out By-law 77, which invests the Council with the necessary authority, and reminded Mr. H. that the letter had been read and approved by the December meeting. Mr. H. then recorded a protest.

The chairman on behalf of the Council proposed the following resolution, which was seconded by Major Abbott.

"Resolved that the Society is willing to become instrumental to the extent of its power in giving to the world Sir H. Elliot's unpublished works in any way in which Lady Elliot, and the friends of the late Sir H. Elliot may consider that the Society's services may be useful."

Rev. K. M. Banerjea opposed the resolution and, in order to meet his objection, Mr. Houstoun proposed as an amendment that "enquiry be made of Lady Elliot if the Society could in any way assist her in giving to the world the unpublished works of the late Sir Henry Elliot."

On being put to the vote, however, the amendment was lost

The original proposition was then carried by a large majority. The Rev. K. M. Banerjea entered a protest, which was duly recorded.

Meteorological Registers kept at the office of the Secretary to the Government of the N. W. Provinces for the months of November and December last, were laid on the table.

Read a paper by Professor Oldham, communicated by the Government of Bengal, and entitled notes upon the Geology of Rajmahal hills, and a letter from the Professor, dated the 15th February, pointing out the economic uses to which coal may be applied on the proposed line of railway from Soory to Rajmahal, coal being found in several places on the western flank of the Raj-mahal hills.

From H. Piddington, Esq. communicating a paper by Dr. Gordon of her Majesty's 10th Foot, on the dust whirlwinds of the Punjaub.

Referred to the Journal Committee.

The Librarian having submitted his usual monthly report of additions to the Library, the meeting adjourned.

Read and confirmed 6th April, 1854. (Signed) J. W. COLVILE.

LIBRARY.

The following additions have been made to the library since February last:—

Presented.

Rees's Cyclopædia in 43 volumes.—PRESENTED BY LADY ELLIOT.

Reports of Summary Cases determined in the Court of Sudder Dewanny Adawlut during 1849—52.—By E. C. Colebrooke, Esq. Calcutta, 1854, 8vo.—BY THE AUTHOR.

Reports of the Revenue Administration of Hazaribág, Arakan, Tenasserim Provinces and Assam, for 1850-51.—BY THE GOVT. OF BENGAL.

Reports on the Government Central Museum, 1853, 2 copies.—BY THE SAME.

Ditto ditto.—BY THE GOVERNMENT OF MADRAS.

Journal Asiatique, No. 7.—BY THE ASIATIC SOCIETY OF PARIS.

The Calcutta Christian Observer, for February, 1854.—BY THE EDITORS.

The Upadeshak, No. 86.—BY THE EDITOR.

The Oriental Baptist, No. 86.—BY THE EDITOR.

The Oriental Christian Spectator, for January, 1854.—BY THE EDITOR.

The Satyárnab, No. 3.—BY THE REV. J. LONG.

The Bibidhártha Saṅgraha, No. 24.—BY THE EDITOR.

Exchanged.

The Athenæum, for November, 1853.

Purchased.

Toison d' Or de la Langue Phenicienne par Mr. l'Abbe F. Bourgade.

Comptes Rendus, 31st October to 28th November, 1853.

Journal des Savants, for November, 1853.

Annals and Magazine of Natural History, No. 72.

Burnes's Bokhara, 3 vols. 12mo.

Robinson's Assam, 1 vol. 8vo.

RA'JENDRALA'L MITTRA.

March 1st, 1854.

JOURNAL

OF THE

ASIATIC SOCIETY.

No. III.—1854.

Manuscripts of the late Sir H. ELLIOT, K. C. B. by Dr. A. SPRENGER, Secretary, Asiatic Society.

Lady Elliot having permitted me to examine the papers and books of her late husband, Sir Henry E., I am enabled to give some account—though in the whole not a very precise one, of the great work—the Indian Historians, on which he was engaged several years previous to his lamented death.

He says in his preface to the first volume; “A few months since (this was in 1846) the compiler of this Catalogue was engaged in a correspondence with the Principal of the College at Delhi (the writer of these lines) on the subject of lithographing a uniform edition of the Native Historians of India. On referring the matter to His Honor, the Lieutenant-Governor N. W. P., it was replied that the Education Funds at the disposal of the Government, were not sufficient to warrant the outlay of so large a sum as the scheme required, and without which it would have been impossible to complete so expensive an undertaking. At the same time it was intimated, that, as few people were acquainted with the particular works which would be selected to form such a series, it would be very desirable; that an Index of them should be drawn up, in order that the manuscripts might be sought for and deposited in one of our College Libraries, to be printed or lithographed hereafter, should circumstances render it expedient and should the public taste, at present lamentably indifferent, show any inclination for greater familiarity with the true sources of the Mohammedan History of India.”

“The author willingly undertook this task, as it did not appear to offer much difficulty.”

Sir Henry possessed, when he undertook this labour, a very valuable collection of books on Indian History, and a more extensive knowledge of the subject than any body else either in this country or in Europe, and was able to draw up in a very short time, a list containing an unexpectedly great number of Historical works replete with useful notices regarding their contents, merits and authors. Fortunately the MS. of this first draft is preserved, and will be a most useful guide for the editor of his papers.

Before he gave the first draft of his labour to the public, he extended his plan. He says on this subject, “The mere Index which the author was invited to compile, has insensibly expanded into several volumes ; for encouraged, not only that no work had ever been written specially on this matter, but also by receiving from many distinguished orientalist both European and Native, their confessions of their entire ignorance on the subject of his enquiries, he was persuaded that it would be useful to append, as far as his knowledge would permit, a few notes to each History, as it came under his consideration, illustrative of the matter it comprehends, the style, position, and prejudices of the author, and the merits or deficiencies of his execution.”

The work on this extended plan was calculated to form four volumes, the first of which was published in 1849. Prefixed to it is the scheme of the whole labour. It was to contain notices of, and extracts from 231 historical works. The first volume according to this plan was to contain sixty-seven, but it contains only thirty-one, and it is therefore clear that the number of volumes would have exceeded that of four.

He continued his search for books after the publication of the first volume, and in 1849 he published in the Persian language a list of desiderata under the title of *Miçbâh altálbyn*. It contains a number of valuable bibliographical notices regarding the books in request, and at the end is added a list of books on Indian Historiography, of which he had copies. His endeavours were crowned with success, and he obtained copies or the loan thereof, of several of the works he was seeking for.

The increased number of materials, and the great interest which his friends in Europe took in his important labours prevailed upon him to enlarge the plan and to give, in the shape of extracts and notes, a complete history of Muhammadan India, which was to fill no less than twelve volumes, and would probably have far exceeded that number. The following are his own words on the plan of the work.

“The unexpected favour with which the first volume of this work has been received by the orientalists of Europe, has induced the author to extend his original plan, so as to admit of its embracing not only a Bibliography of Historians, but a complete History of Muhammadan India according to the following scheme.

“Vols. I. and II. General Histories of Mohammedan India, *Guzerát—Málwa—Deccan.*

“Vol. III. Arabs—Ghaznawides.

“Vol. IV. Ghorians—Khiljis—Tuglaks.

“Vol. V. Timúr—Sayyids—Afgháns.

“Vols. VI. and VII. General Histories of the Timúrian dynasty, *Mahrattas—Rohillas—Jats, &c. &c.*

“Vol. VIII. Timúrians in their rise. Báber—Humayún—Akber.

“Vol. IX. Timúrians in their splendour. Jahángyr—Sháhjehán—Aurangzeb.

“Vol. X. Timúrians in their decline. Bahádur Sháh to Ahmad Sháh.

“Vol. XI. Timúrians in their fall. 'Alamgyr II.—Sháh 'Alam.

“Vol. XII. Original extracts.”

All that is printed of the work on this extensive plan is an “Appendix to the Arabs in Sindh, vol. III. part 1. of the *Historians of India*. Cape Town, 1853.” This little volume contains a mass of the most valuable information and interesting historical parallels on a period on which it was not to be expected that so much light would ever be thrown.

But he has left an abundance of materials for the remaining volumes; and I will now endeavour to give an idea of those which I have seen; there are, however, many translations which I have not had an opportunity of seeing.

They may be divided into four classes. Papers ready for the press, English notes, Persian extracts, and Persian works bearing on the subject.

The Manuscript of the Notices on the *General Histories* of Moham-
medan India, is copied out in a fair hand, carefully corrected and
ready for the press. Even if the first part, which was printed in 1848,
is continued and not superseded, as was the intention of the author,
the manuscript of the General Histories ready for the press will fill
two thick volumes.

The third volume—on the Ghaznawides—is nearly ready for the
press, and so is the ninth, the reigns of Jahángyr and Sháhjahán
being all but completed.

We have therefore four volumes of his valuable work ready for
the press, or very nearly so, and I have reason to believe that the
translations, &c. which I have not had an opportunity to examine
would fill an other volume.

The English notes which he left, are innumerable. He had read
every book on the subject with the pen in his hand, and the number
and extent of his erudite references, extracts and remarks, is perfectly
incredible. It will, however, be very difficult to make a proper use
of them.

The Persian extracts are of very great importance. His acquaint-
ance with the historical literature of India, enabled him at first
sight to select such passages from each work as contain new facts
and illustrate each other. I believe that he has made extracts of *all*
Indian Histories of which he had no copies in his own collection, and
in so far the *materials* for the work are complete. I have unfortun-
ately not been able to arrange and catalogue these extracts for want
of time.

A List of Persian works which he left, including those which do
not bear on Indian Historiography is here annexed. It has been
drawn up in very great haste, and is therefore imperfect, and probably
not free from mistakes. Besides Sir Henry's own works,—which I
distinguish by the letter E, his collection contains also some MSS.
which belong to other parties, but which he had borrowed and were
among his books at the time of his death. The name of the proprietor
is always mentioned. Pencil notes in the fly-page have, in most in-
stances, been copied into this list and marked with inverted commas.

All books are in Persian, unless it is particularly mentioned that
they are in another language.

1. جامع التواریخ. Part of the Jāmi' altawárikhe Rashdy. This fragment begins with the genealogy of Soboktogyn and comes down to the *Second Part containing the history of the Nizárians and their emissaries*. The last rubric is ذكر امام الدوله وجلوس کیا حسن بن محمد.

Beginning این تاریخ مختصر ایست مشتمل بر شرح حال مقامات سلطان محمود بن سبکتگین

E. folio 494 pp. of 17 lines, new, beautifully written.

2. تاریخ خطای. "This is the Indian part of the Jāmi' altawarykh obtained from Muradábád." See Ind. Hist. p. 1.

Beginning ممالک اقوام مذکورہ چند پارہ ولایت معظم است

E. a new copy, 326 pp. of 11 lines.

3. انتخاب از تاریخ گزیده. The third faḡl of the fourth chapter of the Tarykhe Guzydah treating on the Ghaznawides. See Ind. Hist. p. 75.

E. 28 pp. of 17 lines, 8vo. bound with four pages from the Mirāt al'álam, on the inroads of the Arabs in Sind, and extracts from Khayr aldyn's Jawnpúr-námah, 4 pp. also extracts from Azád's Khizánah 'ámirah (see my catalogue I. p. 143) 20 pp. of 15 lines, and extracts from the Akbar-námah, 30 pp.

4. خلاصہ الاخبار فی بیان احوال الاخیار. Kholáḡat alakhbár by Khwánd Amyr. See Ind. Hist. p. 106. Beginning

خلاصہ کلمات راویان اخبار انباء عالی مقدار و نفاۃ منشیات واقعات

E. 666 pp. of 21 lines, a fine old copy.

5. منتخبات کتاب تاریخ الفی. Extracts from the Tarykh Alf, containing the passages bearing on India. See Ind. Hist. p. 143.

Beginning از ذکر وقایع سنہ ثمان و ستین از رحلت اما عبد اللہ بن ابوبکر چون بملک ندم روز رسید

E. 315 pp. of 13 lines, a complete copy is in the possession of Wiláyat Hosayn of Cawnpore, and the first half is in possession of A. Sprenger, a thick volume in folio.

6. طبقات اکبری. Tabaqát Akbary (see Ind. Hist. p. 178.)

Beginning سپاس رفعت اساس بادشاہ حقیقی را سزا کہ حل و عقد

As. Soc. No. 87, 127 pp. of 21 lines.

7. زبدة التواریخ. Zobdat altawárykh. See Ind. Hist. p. 281.

Beginning خطبہ کبریا و جلال بنام شاعنشاهی سزد کہ عالم و هرچہ در عالم

E. 503 pp. of 15 lines copied in 1117. Another copy 391 pp. of 13 lines.

8. Chronological Tables from 101 to 1040. "This is the ninth Faḥl of the Shahyde Çádiq." The author is Moḥammad Çádiq, who has also written the Çubḥ Çádiq on which see Miçbák, p. 21.

Beginning فصل در علم اخبار و سیر و انبارت است از معرفت قصص انبیا و احوال ملوک و سلاطین

9. لب التواریخ. A Survey of the History of India by Bindrāban, a son of Ráy Bahará Mal, composed in 1101.

It is divided into ten chapters فصل. 1. Kings of Dilly. 2. Deccan. 3. Guzrát. 4. Malwa. 5. Khandeish. 6. Bengal. 7. The eastern country (Oudh). 8. Sind. 9. Multán. 10. Kashmyr.

Beginning بادشاهی بی زوال مرخدای راست

E. written in elegant Shikastah in 1194. It was compared under the directions of Sir H. with another copy, and omissions were filled up, 320 pp. of 15 lines.

10. مرأت جهانما. A History of India preceded by notices on general history by Shaykh Moḥammad Baqá, collected by his nephew Moḥammad Shafy'. Beginning wanting

Folio, 768 pp. of 19 lines.

11. هفت گلشن محمد شاهي. A History of the Dynasties of India by Moḥammad Hádiy who had the title of Kámwar Khán, dedicated to Moḥammad Sháh, compiled in 1132.

Bg. الحمد لله رب العالمين و العاقبة للمتقين که قدرت بالغه و حکمت

E. 495 pp. of 11 lines.

12. خلاصه التواریخ. A History of India which comes down to Moḥammad Shujá' a son of Sháhjahán probably by Subhán Ráy.

Beginning نقاش نگارخانه کا ثنات و مصور کارخانه ممکنات

E. 267 pp. of 19 lines.

13. تواریخ هند. A History of India by Rostam 'alyy, who flourished (according to a pencil note) in 1154. It contains also biographical notices of men of learning, saints, &c. Beginning

حمد سپاس مردواربرا که بر دوار دور ملک سلطنت حشمت را بمنشاء کریمه

E. 8vo. 652 pp. of 11 lines.

14. چهار گلشن. A History of India with notices on Castes, Sects Darwyshes, &c. by Chatur Man Ráy.

Beginning اجرایی مسمی بچهارگلشن مولفه مظهر دانش و بینش

E. 4to. 129 pp. 13 lines. There is a reference in the book, to a copy in possession of Nawáb 'alyy Moḥammad Khán.

15. مجمع الاخبار. A History of India from the earliest time to our days by Har Sukh Ráy, compiled in 1214.

Beginning ناصیه فرسای قسم تر زبان منشیان فصاحت بیان وجبهه فرسای
خانه رطب اللسان

E. 1488 pp. of 15 lines.

16. منتخب التواریخ. A History of India, chiefly based on Firishtah by Sadá Sukh, compiled in 1234, and divided into two volumes.

Beginning of first vol. مخزن مخزن نقود حمد و سپاس و معدن معدن

Beginning of second vol. مبنی برده ایوان و شش حجره مشتمل بر

E. first vol. 439 pp. of 15 lines; second vol. 679 pp. of 15 lines.

17. زبدة الغرائب. History of Mohamammad Ridhá Tabátábá whose takhalluṣ is Najm, and who is still alive and resides at Lucnow. It is a work in several volumes of which this collection contains the first and fourth. The first commences with the creation and the fourth with Bábor, and comes down to Gháziy aldyn Haydar. It embraces also the biographies of philosophers, poets, saints, &c.

Beginning of fourth vol. (ninth chap.) بعد از حمد خداوند و نعت رسول

'alyy Akbar, 542 and 635 pp. of 17 lines.

18. جام جم. Chronological Tables of the History of India by Sayyid Azmad Khán of Dilly.

Beginning از اینجا که گلزمین خیر البقاء دهلی

Lithographed at Agra, 30 Tables.

19. تحفة الكرام. A General History with biographical notices of saints, men of learning, &c. more particularly of Sind by Shyr Qáni'. The title is a chronogram for 1154. It is divided into four parts مجلد.

Beginning بعد حمد خالقى که اشارات کون مکان رشحه از عمان قدرت

بیکران اوست

E. folio 736 pp. of 17 lines.

20. عجائب المخلوقات. A Persian translation of Qazwyny's Wonders of the Creation. "De Rossi Diz. 110, Hájí Khal. IV. 188. This valuable copy does not contain the chapters on cities and forts, which, Major Rawlinson says, he has seen in only one out of about one hundred copies—Journ. Geogr. Soc. Vol. X. p. 83." Translated under Abú-l-Motzaḥḥar Ibráhyim 'ádilsháh.

Beginning العظمة لك والكبرياء لجلالك اللهم يا قايما الذات

E. two copies, one very splendid and old, 840 pp. of 19 lines, the other 542 pp.

21. *شجاع حیدری*. A Geography of India, Persia, &c. compiled under Jahāngyr (reigned 1014—1037) by Moḥammad Haydar.

Bg سپاس بیقیاس مرخالقی را که طبقات اسمان وزمین را درهواصعلق داشته
E. 176 pp. of 17 lines, copied in 1238.

22. *تاریخ محمدی*. Chronological Tables by Moḥammad Bég Hārithy Badakhshy in two volumes, every line contains a date, and over every date the name of the authority is written in red ink. The copy before me contains only the second volume, which commences with 781 and comes down to 1190.

این دو بیت عربی که اسم احقر العباد میرزا محمد خصه الله
فنی کل یوم

Naṣr Allah Khán, Deputy Collector of 'alyygurh, an autograph, 1238 pp. folio.

23. *عقد الجواهر*. Obituary (in Arabic) of one hundred years, beginning with 1001 by Moḥammad b. Abú Bakr. It contains, year by year, the names of celebrated persons who died in it and their biography.

الحمد لله الذي انشا الموجودات بباهر قدرته واحيا

Moḥammad Hasan Peshkár of Kannawj, 300 pp. of 22 lines, a good copy of an important work.

24. *روضة اولی الالباب*. A General History by Abú Solaymán Dáwúd, who was alive in 715. Beginning wanting.

E. 402 pp. of 21 lines.

25. *تاریخ مرزا مبارک الله*. The History of Myrzá Mobárak Allah, who flourished under Farrokhsiyar.

الحمد لمن يقول في حق كلامه فاتوا بسورة

'alyy Moḥammad Khán of Jhajhar, 236 pp.

26. *برهان الفتوح*. A Universal History by Moḥammad 'alyy b. Moḥammad Čádiq Hosayny Nayshápúry who was alive in 1148. It comes down to the author's life-time and contains many important dates.

نیکوترین سخنی که قافله سالار کلمه و کلام

E. 426 pp. of 17 lines, an autograph written in 1148.

27. *کتاب احسن التواریخ*. A Universal History, by Hasan b. Moḥammad Kháky Shyrázy, dedicated to Akbar. It comes down to A. H. 998.

زبان قلم و قلم زبانرا قدرت و قوت ان کجاست

E. small folio 662 pp. of 14 lines, of some age.

28. منتخب التواريخ. History, Biography and Geography from the beginning of the world by Ibn Darwys̄h Mohāmmad Balkhy. The latest date which I observed is 1119. Beginning

سبحانک لاعلم لنا الا علمتنا انک انت العلیم الحکیم اعجوبه بکار عالم بوقلمون

E. 332 pp. of 13 lines.

29. جام جهاننما. A General History from the creation, compiled by Qudrat Allah Ġiddyqy in 1191. "But at folio 432, the year 1193 is mentioned." It is divided into 39 chapters طبقه.

Beginning عالی کوهری که زینت تاج سروران

"Mohammad Mián's son (?) Sa'y'd aldyn Ahmad Khán," 1378 pp. of 21 lines.

30. مرآت آفتاب نما. Geography, Biography and a Universal History, by Sháh Nawáz Khán. "Sháh Nawáz Khán died before 1809 or in it. He was Treasurer to the Myr Bakhshi and Khánsámán and received a monthly stipend of 2,500 Rupees." The book is divided into two Jalwah, which are subdivided into tajalli.

Beginning مقالیکه خوش بالی لالی متلالی الفاظ ابدارش

E. 623 pp. of 20 lines, copied in 1811.

31. یادگار بهادری. A Universal History by Bahádur Singh, compiled in 1232. It contains much useful information regarding founders of new sects in India, saints, learned men, &c. also regarding the history of Oudh.

Beginning بعد از سپاس ایزدی که آفریننده عالم و عالمیان است

E. two volumes containing in all 2082 pp. of 17 lines, an autograph.

32. بهجة التواريخ. A General History by Shukr Allah, who is probably still alive. The latest date which I observed is 1263.

Beginning الحمد لله الذي براكل شی ثم ارعاه و دراکل حی فافناه

E. 604 pp. of 11 lines.

33. مجموعه خلاصة الاحوال. A General History by Mohāmmad Ġadıq, whose takhalluṣ is Akhtar (see my Catal. I. p. 599,), dedicated to Sir Henry Elliot. Beginning

جواهر زواهر حمد و سپاس افزون تراز مقدار قیاس نثار بارگاه کبریای

E. 118 pp. of 13 lines.

34. سلطان التواريخ. A Universal History, containing considerable information regarding Oudh, by Ratan Singh a son of Ráy Bálak Rám. "Presented by the author about the time of his death, 1851.

I have seen the original MS. of this work which was dedicated to Naçyr aldyn Haydar."

سر بلند پایه سخن به یمن ستایش رفیع بارگاہی است که
بنای چرخ مقرنس در وسعت کدّ

E. 640 pp. of 11 lines.

35. ترجمه عجایب طاهر القصص. A History of the Prophets including Mohammas, in Urdú, by Mohammas Fakhr aldyn Hosayn.

تبارك الله احسن الخالقين

E. Lithographed s. a et l. (Agra?) small folio, 692 pp. of 21 lines.

36. مفتاح التواريخ. Key of History, being a collection of the most valuable chronograms in the Persian language, also inscriptions of ancient buildings, collected by Thomas Beale. Beginning

E. Lithographed, Agra, 1849, 4to. 609 pp.

37. تاريخ رشیدی. History of Myrzá Haydar Gurgány.

افتتاح تاريخ جهان داري و ابتدا ظفر بختياري حمد و سپاس حضرت
'alyy Mohammas Khán, 729 pp. of 14 lines.

38. تاريخ راجا ولي. A General History of India, by Munshiy Waly Rám, whose takhalluṣ was Walyy. The latest date which I observed is 1132.

بشنو زولي وفای دنیا ای شاه

E. two copies, one has 176 pp. of 9 lines, new.

39. تاريخ سعادت جاويد. A General History of India which comes down to Sa'ádat 'alyy Khán, who was succeeded in 1212 by Harnám Singh Námy, a son of Gurdás Singh.

حمد و ثنای درگاه صمدیت بر اصناف خلائق واجب باشد
که جان در تن افزیده صانع حکمت اوست

E. 503 pp. of 14 lines.

40. میزان دانش. A General History of India which comes down to the reign of 'álamgyr.

Beginning

E. 102 pp. 8vo.

41. دیبان احوال راجه های عظیم الشان هندوستان از راجه جدشتر. An account of Hindú Rájahs from Judhister derived from the Mahá-bhárata, apparently by a Hindú.

از تاریخ کتاب های هندی خصوصاً مهابهارت

E. 8vo. near 100 pp. of 11 lines.

42. فصل المجالس. A General History in ten chapters. In

the commencement some pages are wanting, the book now begins
 سیر و تواریخ و اخبار

E. 431 pp. of 13 lines.

43. چار چمن. A History and Geography of India, compiled by Dawlat Ráy in 1225. At the end is a table of distances.

Beginning حمد را با تونسبتي است درست بر در هر كه رفت بر در تست
 'allyy Mohammad Khán, 480 pp. of 15 lines.

44. آثار الوزرا. A History of celebrated Wazyr by Mawláná 'abd al-Wahháb. The last Wazyr mentioned is Nitzám almulk Khwáfý (see No. 79 *infra*).

Beginning شرايف تحميدات حضرت بادشاهي را كه در ايجاد گانيات

E. 430 pp. of 15 lines.

45. چچ نامه. A Historical Romance, the hero of which is Dáhir b. Chach and his daughter, by 'allyy b. Hámid b. Aby Bakr.

Beginning حمد و ستايش مركان خداي را كه ذكر كرام او خلاصه ايمان است

E. 202 pp. of 17 lines, copied in 1848.

46. نگارستان. A Well-known General History, by Ahmad b. Mohammad.

Beginning اي طرازنده بهارستان وي نگارنده نگارستان

E. two copies, 200 pp. of 21 lines. I believe the book has been lithographed at Bombay.

47. نظام التواريخ. A General History more particularly of Persia, ending with the year 694, by the Qádhíy alqodhát Sa'yd.

Beginning حمد بي نهايت و شكر بي غايت مدعي را كه

E. 202 pp. of 11 lines, new.

48. كتاب چهار گلزار شجاعي. Extracts from the Chahár Gulzár Shujá'y: "Dr. Sprenger says, this is an autograph of the author, but says, it contains some mistakes afterwards corrected; 1219 pp. lines vary from 16 to 21, average 18." This note, Sir Henry, refers to the MS. from which the one under notice has been copied. This history was compiled in 1167 by Har Charan Dás, but he continued it to 1201. It is a general history of India in which, however, the contemporaneous history is much fuller than the preceding parts. The extracts contain only modern history.

Beginning حمد گويم ان خدای پاک را صورت انسان نموده خاک را

E. 559 pp. of 15 lines, 8vo. not bound.

49. تاريخ كامل ابن اثير. The Large Historical Work of Ibn Athyr

(d. 630) in Arabic. Two volumes. The first contains the ancient history, the life of Moḥammad and comes down to A. H. 69. Beginning الحمد لله الكريم ولا اول لوجوده. The other volume is defective at the end, and contains the history from 372 to 417.

Beginning في هذا السنه ورد.

The first vol. belongs to Col. Rawlinson, small folio, about 800 pp. of 27 lines; the other vol. belongs to Ratan Singh, it is old, and written with great care having all the vowels, 490 pp. of 19 lines.

50. طبقات ناصري. The Nāṣirīan ages or history by Abū 'amr 'othmān b. Moḥammad al-Minhāj Júzjány, dedicated to Nāṣir aldyn Abū-l-Motzaḥḥar Maḥmūd Sháh b. Sultán Iltatamsh الشمس. When the author was Qádhīy, he found a book which contained chronological tables, and it had been written under Nāṣir aldyn Soboktagyn, from this he compiled this universal history from Adam to his own time. It is divided into twenty-five Tabaqats.

Beginning الحمد لله الاول الذي لا ابتداء لوجوده

Tirhuán Rájah (near Bandah) 894 pp. of 15 lines. An autograph, as appears from the postscript:

كتب المنهاج بن سراج في الخامس شهر ربيع الاول سنة خمسين ستمائة

51. طبقات ناصري. "This cannot be the Tabaqáte Nāṣirīy, for Maḥmūd Sháh of Guzerát is mentioned A. D. circa, 1500, and, may be the lacuna contained some later king; and this may be Bahádur-sháhy—or perhaps it is the Tabaqát Maḥmūd-sháhy by Naṣyr Khán, which must be a general history as Firishtah quotes it I 506, in Gháziy Khán's reign and 446 in Bahmany's reign."

This is a fragment of an universal history beginning with the creation and ending with the death of 'alyy. It has no preface. From the imprecations which follow the names of Mo'áwiyah and the members of his family, it would appear that the book was compiled by a Shy'áh. It was compiled under Maḥmūd Sháh b. Moḥammad Sháh b. Aḥmad Sháh b. Moḥammad Sháh b. Motzaḥḥar Sháh, to his name Sir H. has added the following pencil note "this is the Begura who died in 917=1511.

Begining مقاله اول در ذكر انبيا و رسول و پادشاهانی که پیش از اسلام بودند و آن مشتمل است بر دو فرقه فرقه اول در ذكر انبيا و رسول و فرقه دوم در ذكر پادشاهانی که پیش از اسلام بودند فرقه اول در ذكر انبيا و رسول و ما درین کتاب بعض از انبيا و رسول ذكر كنم اقداء بقوله تعالى

E. 326 pp. of 17 lines, new.

52. تاریخ و صاف. The celebrated History of Waççáf (see Ouseley Persian poets, p. 230, Hammer Gesch. d. Schönen Redek. Pers. p. 243, and my Catalogue, I. p. 566.)

Beginning حمد و ستایش که انوار اخلاصش افاق و نفس را چون فاتحه صبح صادق مثلالي سازد

Rájah of Terúa, a fine copy, in one volume, folio, 798 pp. of 19 lines. Sir H. has extracts from the last part which were copied at Lucnow from Chauky Prashád's copy.

53. تاریخ فیروزشاهی. History of Fyróz Sháh from his birth to his death by Sháms Siráj 'afyf, it is divided into five parts which were subdivided into ninety Moqaddamahs. The last five Moqaddamahs are wanting.

Beginning

قال الله تعالى ولا يعلم تاويله الا الله والرا سخون في العلم الاية قال النبي

E. new but carefully corrected, 343 pp. of 17 lines.

54. تاریخ فیروزشاهی. The History of Fyróz Sháh and his predecessors by Dhiyá aldyn Barany.

Beginning حمد و ثنا مرخدای را که اخبار و اثار انبیا

'allyy Mokhammad Khán, a fine copy, 528 pp. of 15 lines; another copy belonging to Nawáb Dhiyá aldyn Khán, 581 pp. of 21 lines.

Beginning الحمد لله رب - - چنین دعا گوي

"Balbún's life is placed last and from p. 219 this copy seems to be an extract."

55. توزك جهانگري. The life of Jahángyr from his birth to A. H. 1034, by Mohámmad Hádiy.

Beginning حمد و ثنای بی مروح و سپاس و ستایش لا یحصى ولا تعد

E. folio, 783 pp. of 15 lines.

56. تاریخ مظفري. A History of the Tymúrides, compiled in H. 1212, by Mohámmad 'allyy Khán Ançáry.

E. 1005 pp. of 15 lines.

57. ظفر نامه. History of Tymúr (the same which has been translated into French) by Mollá Sharaf aldyn 'allyy Yazdy.

Beginning افتتاح تاریخ جهانداري و ابددای نامه ظفرو بختیاري

E. two copies, 382 pp. of 11 bayts. Copies of this book are frequent, but very few are complete, the life of Chengyz Khán and his successors being almost universally omitted.

58. ملفوظات تیموري معروف بتوزك تیموري. Autobiography of Tymúr.

"Steward's translation ends at p. 261."

Beginning حمد بليغ سبحانی را که بمقتضای کریمه انا جعلنا

E. 522 pp. of 15 lines, new.

59. تاریخ مبارک شاهي. *Mobárah-sháhian History*, by Yakyà b. Aḥmad b. 'abd Allah of Sirhind *السيهرندي* (*sic*). It begins with Sultán Mo'izz aldyn b. Moḥammad b. Sám Ghóry and comes down to Mobárahsháh—A. H. 838.

Beginning سپاس بی قیاس مرحضرت خالق نا الجن والانس

E. 12mo. 263 pp. of 13 lines, new.

60. تاریخ عالی. *A History of the Patan kings of India*, by Amyr Khosraw “composed in 709; but see p. 26.” Beginning

وله این نامه که نقد فتح دارد در جیب شد نام خزاین الفتوحش از غیب

E. 188 pp. of 15 lines.

61. تاریخ سبکگین. *The fifth volume of the History of Sobak-tagyn*, by Abú-l-Fadhl Bayhaqy. It commences with 421 and ends with 432.

Beginning زندگانی خداوند عالم سلطان اعظم ولی النعم درازباد

E. 762 pp. of 17 lines, of same age.

62. تفریح بخش. “This seems to be the same as my Afghán History by Sheo Pershád.” The book was compiled by Sheo Pershad in 1770, A. D. and dedicated to Nawáb Faydh Allah Khán. It begins with the reign of Moḥammad Faryd who had the title of Shér Khán. The last rubric is احوال مرزا سعادتعلی خان خلف نواب شجاع الدوله.

Beginning فیض آفرینی را الوف ستایش و نیایش سزد و کارساز

Nawáb 'alyy Moḥammad Khán, small folio, about 700 pp. of 17 lines.

63. تاریخ شیرشاهی موسوم بمخزن افغانی. *The History of Shér-sháh* by Ibráhyim. It is based upon *Tabary*, the *Majma' alansáb*, the *Guzydah-jahán-Kusháy*, and more particularly on the *Ma'dam alakh-báre Aḥmady*. The latter book was composed in 1020 by Aḥmad Khán b. Bahly Khán Kanbú.

This work is divided into six chapters باب and three dafters, viz.: 1. Jacob who is considered the father of the Afgháns; 2. On *Talút* 3. Khálid b. Walyd; 4. Bahlól and the Lodians; 5. Shér-sháh and Islám-sháh; 6. Darwyshes. At the end, it is said, that it (the copy or composition?) was completed in 1120.

Beginning الحمد والمنت ایزد متعال را که در قالب

E. two copies, one very splendid, 696 pp. of 11 lines

64. *تواریخ افغانه*. A History of the Afgháns. "This book was procured from, I think, Nizám Ali Khán, the old vizier. It is a worthless compilation, but founded on Afghán apparently, rather than Indian, sources. He quotes the Tawárikh Jahángyry (p. 134), Tawárikh Nizám (p. 136); Majmá alansáb Hossein, T. Khán Jahány and Shér Sháhy (p. 129). The author's name does not appear, and it is not worth knowing."

Beginning *ذکر در بیان اولاد ابدال ولد ترین از ترین سه پسر*

E. 168 pp. of 11 lines, of some age.

65. *تاریخ افغانه*. History of the Afgháns, compiled in 1195, and containing also an account of the Rohillas at Rámpúr.

Beginning *بدانکه دانیان حق تاریخ در احوال ملوک و سلاطین که در مملکت فسخه هندوستان بذویت کوس دولت*

E. 72 pp. of 14 lines.

66. An account of the Afghán tribes, by Sayyid Maẓmúd.

Beginning *آنچه احوال اقوام چهار گانه افغان*

E. 84 pp. of 11 lines.

67. *منتخب التواریخ*. History from Bahlól to Shyr Khán by 'abbás. "From the second line of the second page it corresponds with the 2nd Book of Horn's Afgháns, the variants being marked in the margin."

Beginning *حمد آن قادر بیچون بیچگون و ثنای خرد آن رهنمای رهنمون*

E. 94 pp. of 19 lines, copied in 1239.

68. *ترجمه تاریخ بمینی*. A Persian translation of the History of 'otby, by Mohámmad Karámat 'alyy of Dilly.

Beginning *پس از طراوت چمنستان سخن طرازی*

E. a new copy, 8vo. 79 pp. of 15 lines. The Arabic (original) text of this book has been edited by Dr. A. Sprenger.

69. *مآثر الامرا*. The second volume of the Biography of the Nobles of the Court of Dilly.

Beginning *حرف سین سیف خان کوکه برادر کلان زینخان کوکه است گویند والده اش همیشه دختر آوردی و پدر بمقتضای بشریت آزردہ شدی*

E. 838 pp. of 15 lines, copied from the MS. of the As. Soc. There is also a copy of this important work in the possession of Col. Anderson, and one in possession of Mr. Elliott of Patna.

70. *تذکرۃ الامرا*. Biographies of Nobles at the Indian Court, compiled by Kywal Rám in 1184. "This is not an abridgment of the

Máthir alomará. It contains a little matter not to be found there.” The biographies are alphabetically arranged.

Beginning بعد حمد قادریکه یک بیک امرکن هجده هزار عالم را موجود فرمود و پس از نعت پیغمبرکه

E. 1408 pp. of 15 lines.

71. تذکرة الامرا. An account of the petty sovereigns and nobles of India, compiled for Col. J. Skinner.

Beginning بعد تمهید تحمید مالک الملکی که انتظام سلسله کائنات بوجود با عدل وجود فرمان رویان

E. 590 pp. of 13 lines, new.

72. طبقات شاهجهانی. Biographies of men of learning, poets, &c. from Týmúr to Sháhjahán, by Mohámmad Çádiq. It is divided into ten *Tabaqát*. “I have gone through this work, entered under their proper heads, names and passages for future reference.”

Beginning آغاز سخن سپاس و ستایش خداوندی تبار

E. 320 pp. of 13 lines, new.

73. تاریخ چغتای. A History beginning with the emperor Bábor by Azmad Shafy’ Tiherány.

Beginning جهان جهان ستایش و افرین پادشاهی را

E. 8vo. about 350 pp. of 13 lines.

74. عبرت نامه. A History of Týmúr and his successors in India to the time of the author (who died the last twenty years.)

Beginning گوناگون ستایش بادشاهی را سزااست که در طوفان هول افزای

E. 484 pp. of 25 lines.

75. تذکرة السلاطين چغتای. A History of the Moghol Kings (chiefly of India) from Chengyz Khán to A. H. 1036, by Mohámmad Hádiy, who had the title of Kámwar Khán, (see No. 11).

Beginning چون صفحه کاغذ بیاراستم و خامه دوزبان برداشتم

E. 1040 pp. of 15 lines. “This very valuable copy is written in the author’s own hand writing. It only extends to the accession of Sháhjahán.” It was written in the 5th year of Mohámmad Sháh.

76. خلاصه التواریخ. A History from Bábor to the author’s life-time (A. Façly 1195) by the Mohárájah Kulyán Singh.

Beginning ارایش و پیدایش هر نسخه و کتاب بستایش و نیایش

E. 715 pp. new.

77. ذکر پادشاهان تیموری. An account of the Týmúrian sovereigns, with portraits, compiled under Humáyún by Sayyid Moghol ‘aly Khán.

الحمد لله رب العالمين و الصلوة والسلام على رسوله
محمد وآله واصحابه اجمعين اما بعد چنين گوید

'ally Mohammad Khán, 168 pp. of 10 lines.

73. فتح نامه بابر. The Book of Victory, being a poem by Hájy Mohammad Ján Qodsy, on Bábor's victory over Ibráhym Afghán Lódy, and on the death of the latter (on Qodsy, see my Cat. p. 536).

Beginning از بابر مهر چهر

Nawáb 'ally Mohammad Khán, 25 pp. of 10 bayts.

79. طبقات بابري. A History of Bábor, by Zayn Khwáfy, who says that he wrote down in Persian what the emperor dictated in Turkey. It may be a translation of the Wáqí'át.

It begins without introduction نهضت فرمودن حضرت سلیمانی نوبت پنجم
بجانب هندوستان و گل نصرت و کامرانی چیدن از جوانب آن بوستان

A friend of Sayyid Ján, at Cawnpore, 8vo. 326 pp. of 15 lines, a very old copy. There is also a copy of A. H. 998 in Sir Henry's collection.

80. همایون نامه. History of Humáyún, compiled in 859.

Beginning wanting.

E. 134 pp. of 15 lines: the same volume contains some Ghazals of Qáyib.

81. اکبر نامه. A History of the reign of Akbar, from his succession to 1010, by Ilahdád Faydhy Sirhindy.

Beginning بنام حضرت دادار اکبر که کنه او ز فهم ماست برتر

E. 453 pp. of 15 lines, a new copy. Also a copy of the third volume, 100 pp. of 13 lines.

Beginning از آنجا که فطرت

82. تکمله اکبر نامه. Supplement to the Akbar-námah, by the Shaykh 'abd al-Qamad.

E. 122 pp. the same volume contains some poems of 'onçory, part of the preface to the third Dywán of Amyr Khosraw, and an extract from the Dywán of Badre Chach. Among the English papers there are translations, or dissertations of the last named two pieces.

83. سوانح اکبري. A History of Akbar beginning with his marriage, by Amyr Haydar Hosayny Bilgrámy.

E. 843 pp. of 15 lines.

84. Third age or division of the تحفه اکبرشاهی containing in three chapters باب, the history of Shér Khán Súr, of his son Isiám

Khán and of the relations and nobles of Shér Khán who claimed sovereignty. The book was compiled by 'abbás b. Shaykh 'allyy and dedicated to Akbar. Beginning

جنس حمد واثنيه خالق بریه را سزد که سرسبزي رياض ممالک
'allyy Mohammad Khán 161. pp. of 14 lines.

85. *توزک جهانگیری*. Autobiography of Jahángyr, containing the history of twelve years of his reign ending with 1014. "This copy and the copy from which it was completed, both end with Jahángyr's reaching Akmadábád, I have no doubt this is the veritable Duwáz-dasalah."

Beginning از عنایات بیغایات الهی یکساعت نجومی از روز پنچشنبه
E. two copies, 122 pp. 13 lines.

86. *تاریخ سلیم شاهي*. Salym-sháh's History of Jahángyr, which is usually called the autobiography of Jahángyr. It begins with the year 1014, and is therefore a continuation of the preceding.

Beginning حمد بیغایت و شکر لا نهایت مبدعی را که یک امرکن اجرام
فلکی و اجسام عنصری را از ممکن عدم بوجود آورد
E. 109 pp. of 16 lines, copied in 1239.

87. *توزک جهانگیری*. The apocryphal autobiography of Jahángyr, the author of which is Mohammad Hádiy. It ends with the year 1037.

Beginning حمد و ثنای بی مروح و سپاس و ستایش لا تعد
E. small folio, 370 pp. of 23 lines.

88. *جهانگیر نامه*. A History of Jahángyr, from his birth to his death, by Kámkár Khán.

Beginning سپاس قدسی اساس مرداوری را

E. 332 pp. of 11 lines. There is a book belonging to 'allyy Mohammad Khán, which has the title of *روضۃ الجنان*, and on the fly-page of which Sir H. wrote, "Part of the Jahángyr-námah I believe." There is also a copy in possession of Mawlawy Sadyd aldyn Khán.

89. *اقبالنامه جهانگیری*. The second volume of a history of Akbar and Jahángyr, by Mohammad Sharyf Mo'timad Khán. It begins with the year 969.

Beginning شهنشاه مظهر قدرت اله مورد کرامت نامتناهی

E. two copies, 236 pp. of 25 lines, there is also a very neatly made table of contents of the first volume of this work, it was made in 1240.

90. عمل صالح. Biography of Sháhjahán, from his birth to his death, 1076, by Mohammad Çálih, at the end are some biographies of celebrated contemporaries.

Beginning روی چمن بیان و خذده روی گلبن سخن از حمد
بهار پیرای گلشن گاف و نون و جریده کشای

Myán Mohammad, 1120 pp. of 19 lines, another copy belongs to Nawáb 'ally Mohammad Khán, 1278 pp. of 21 lines.

91. Biography of Sháhjahán and 'álamgyr, by Mohammad Çádiq. It begins with the accession of Sháhjahán and comes down to the year 51 of the reign of 'álamgyr.

Beginning اجناس حمد و سپاس حضرت افریدگاربرا که شهاب ثاقب

E. two copies, 410 pp. of 24 lines, one copy is of same age

92. شاهجهان نامه. Sháhjahán, an epic poem, by Qodsy (Kalym?).

Beginning بنام خدائی که داد از شهبان جهان بادشاهی به شاه جهان

E. 231 pp. of 11 bayts; contains merely an abstract.

93. شاه جهان نامه مرزا امینا. A History of ten years of Sháhjahán's reign, in prose, by Munshiy Myrzá Mohammad Amyná.

Beginning طراوت چمن الفاظ و تازگی گلشن معانی

E. 4to. 448 pp. of 21 lines, a bad copy, and a copy belonging to 'ally Mohammad Khán.

94. شاهجهان نامه. Biography of Sháhjahán, by 'abd al-Hamyd of Láhór. It begins with the year 1037, and ends with the Jashan of 'álamgyr, at the end are a few biographies of celebrated contemporaries.

Beginning نگارش تاریخ روز نامه بهروری و بختیاری

E. 296 pp. of 17 lines. This is a mere abstract, the whole work has 718 pp. of 17 lines.

There is another History of Sháhjahán, 884 pp. of 11 lines, in the collection, in which there is the following pencil note, "This is precisely the same as the 2nd vol. of the Sháh-námah abstracted by Chuneé Lal, and the blank Shurgirf of this volume may be filled up from that abstract. The biographies of learned contemporaries are omitted at the end. How is it, this contains the whole reign? It can scarcely be Abdul Hameed's."

95. شاهجهان نامه. The History of Sháhjahán in prose, by Mohammad Tâhir who had the title of 'ináyat Khán. He was librarian of the emperor and a son of Motzaffar Khán, and compiled this

work in the 31st year of Sháhjahán, from the work of 'abd al-Hamyd, &c. It is stated at the end that it is usually called Molakhkhaç.

Beginning بنام پادشاهی پادشاهان سرفرازی ده صاحب کلا هان

Rájah of Benares, 4to. 360 pp. of 19 lines, written in 1821. It contains many pencil marks of Sir Henry. Another copy belongs to Faqyr Núr aldyn of Láhór.

96. شاه جهان نامه. History of Sháhjahán from the first year of his reign to 1057, by Mohámmad Wáarith.

Beginning برسرنامه دبیر قلم آنچه کند بهر تینم رقم

E. 532 pp. of 19 lines, the copy is of some age.

97. A History of Sháhjahán, which begins with the 22nd year of his reign.

Beginning غرة جمادی الثاني سال هزار و پنجاه و هشت هجری فرخ فال
“Does not correspond with Waris.” At the end are biographies many of them very useful.

Jawáhir Mald, 550 pp. of 19 lines.

98. شاهجهان نامه. History of Sháhjahán, by Jalál aldyn Tabátabá

Beginning درین ایام سعادت انجام یعنی سراغاز سال پنجم از جلوس

E. 330 pp. of 21 lines, an old copy.

99. شاهجهان نامه. History of Sháhjahán and an account of his ancestors, by Bhagwant Dás. It ends with the year 1037.

Beginning بر ضمائر ارباب فطرت و خواطر اصحاب خبرت مخفی
و محتجب نماند

'alyy Mohámmad Khán, 239 pp. of 9 lines.

100. چهارچمن. The praise of Sháhjahán, in elegant prose and verse, by Munshiy Chandar Bhán, whose takhalluç was Bráhmañ. The first Maurañ treats on the delightful society and the conquests of the Emperor, &c. 2. Provinces of India; 3. on Poetry; 4. elegant prose.

Beginning الحمد لله رب--چون ادای شکر نعمت حضرت صمدیت و اظهار علو
مدارج و مناقب خاصان بارگاه الوهیت

E. 236 pp. of 13 lines.

101. چهارچمن. The third and fourth parts of the چهارچمن of Mohámmad Myr, whose takhalluç was Arshad, containing the Institutes of the emperor Sháhjahán.

Beginning آغاز چمن سوم بذروة عرض بهره اندوزان بساط

E. 192 pp. of 18 lines.

102. History of Sháhshujá' a son of Sháhjahán, by Mohámmad Ma'cúm b. Hasan b. Çáliḥ.

Bg. تاریخ شاه شجاع حمدی که زبان ما قاصران رایان و سرش است نثار کبریای
'alyy Mohámmad Khán, 84 pp. of 23 lines, copied in A. H. 1200.

103. Autobiography of Asad Bég Qazwyny, who was a friend of Abú-l-Fadhł, and had the title of Pyshraw Khán and died in 1041.

Beginning بنام ایزد دانای الخ

E. 4to. 55 pp. of 21 lines, a good copy.

104. ظفر نامه عالمگیری. A History of 'álamgyr, from his birth to the year 1076, by 'áqil Khán (Rázy? See my Catalogue I. p. 543).

Beginning ابوالمظفر محی الدین محمد اورنگزیب بهادر بادشاه غازی

E. three copies, 245 pp. of 11 lines.

105. مآثر عالمگیری. A Chronicle of the reign of 'álamgyr, in which the events of his reign are recorded year by year, by Mosta'idd Khán Sháfiy.

Beginning انتخاب صحایف ایجاد انس و جان

E. three copies, 620 pp. of 15 lines. One copy begins with A. H. 1078 and ends with 1118.

106. فتوحات عالمگیری. Victories of 'álamgyr, or history of the reign of this sovereign, by Mohámmad Ma'cúm b. Çáliḥ.

Beginning حمدی که زبان همچو قاصران را بان حوس است نثار
جناب که پای است که تلون حالات و تصبب واقعات

Nawáb Dhiyá aldyn Khán of Dilly, 83 pp. of 17 lines. There is a copy of a history of 'álamgyr, by a Shaykh whose takhalluḥ was Rāfat, and who is also the author of the ائینه جهان نما, like the above work it has the title of فتوحات عالمگیری and begins ایزد که فتوحات
جهانراست قدیر و ز قدرت او. It belongs to 'alyy Mohámmad Khán, 608 pp. 18 lines.

107. History of Báhádur Sháh, by Ni'mat Khán, whose takhalluḥ was 'áliy. "This appears to be by Nimat Khán who did write a History of this period. See Preface to T. Shahádat, p. 10."

Beginning دست بچود بر آورد بخود کریم بارونعم دو جهان در نفس
خلق ازل نا باید مصروفس افسر سلطان سخن حمد مالک الملکی است

E. 524 pp. of 14 lines, a new copy.

108. ادب عالمگیری. Letters of Shaykh Abú-lfatḥ Qábil Khán addressed to various persons. The following chronogram contains

the date (1015 ?) when they were collected گل از باغ جان شد چو تاریخ او بباغ ارم دل نه بندد کسی. At the end is the history of the commencement of 'álamgyr's reign.

Beginning خداوند علیم حکیم خرد بخش سخن آفرین

Nawáb 'ally Mohammad Khán, small folio, 762 pp. of 24 lines, a good copy.

109. An account of the war between Bahádur Sháh and Mohammad A'tzam Sháh, also the history of Jahándár Sháh, by Myrzá Mobárah Allah, whose takhalluṣ was Wádhiḡ (see my Cat. I. p. 583).

Beginning تمهید نگارش این سوانح وجامع وشریف ابن مرزا مبارك امید واضح تخلص مخاطب بارادت خان بن کفایت خان شکسته نویسی مشهور است

Nawáb Dhiyá aldyn Khán, 144 pp. of 17 lines, in the same volume as the وقایع حیدرآباد copied in 1192.

110. تاریخ بهادر شاهي. A History of Bahádur Sháh from his accession to the accession of Mohammad Sháh, by Mohammad Qásim, whose takhalluṣ was 'ibrat.

Beginning رسمی است قدیم وطریق مستقیم که پرده از ثقلب روزگار

E. 170 pp. of 21 lines, copied in 1230. Two other copies, one of Sir Henry and one of 'ally Mohammad Khán (360 pp. of 17 lines) have the title of 'ibrat-námah, and are much fuller than this.

111. عجایب الافاق. A History from the accession of Farrokhsiyár to the accession of Mohammad Sháh.

Beginning wanting.

E. 162 pp. of 18 lines.

112. شهادت فرخ سیرو جلوس محمد شاه. Death of Farrokhsiyár and accession of Mohammad Sháh, by Myrzá Mohammad-bakhsh, whose takhalluṣ was Áshúb.

Beginning الحمد لله رب العالمین والصلوة والسلام علی رسوله سیدنا وسندنا وحبیبنا مولانا

E. 607 pp. of 15 lines. "It does not appear whether another volume was ever completed. Nawáb Dhiyá aldyn's copy of Wási, was written by this author, who has put marginal notes of objections which he has enlarged upon in this work. The India House MS. with this title No. 250—begins and ends like this, said there to be the work of Myrzá Mohammad Bakhsh."

113. كتاب نادر الزماني. History of Mohámmad Sháh to the year 1141, at the end biographical accounts of saints, learned men, &c. are added.

Beginning بهترین بیان و خوشترین ذکر انسان حمد حمدیست

'ally Mohámmad Khán, 640 pp. of 19 lines.

114. بیان واقع. History of Nádír Sháh, also the author's own memoirs, by Hájí 'abd al-Karym.

Beginning محفل آراكن بذكر خود زبانم

E. and Nawáb Dhiyá aldyn Khán, 120 pp. of 12 lines.

115. تاريخ احمد شاهي. History of Aẓmad Sháh and Tymúr Sháh, by Imám aldyn Hosayny.

Beginning حمد بی حد و ثناء عد سزاوار بادشاهی است که لمن الملک
اليوم لله الواحد القهار شان جلال اوست

E. three or four copies, about 500 pp. of 12 lines.

116. ذکر سلطنت محمد عزیز الدولت المخاطب عالمگیر پادشاه. This is a history of 'álamgyr II. without preface, the above title is written at the end of the book in red ink.

Beginning از آنجا که زمانه نیرنگساز و فلک کجرفتار

Rája of Tírhúa, 450 pp. of 13 lines, written in 1172, Sir Henry wrote to me that it is unique, and that he intended to have the whole translated. A copy of the original has been made for Sir H. and is among his materials.

117. شاهعالم نانه. History of the reign of Sháh 'álam, by Bhikary Dás. "The author is praised for his hand writing in the Yádgár Bahádury under the head of Khotút."

Beginning حمد بحد خدا و رسد که میزان ادراک مروت حقیقت
دانش نمی سنجد

E. 663 pp. of 11 lines.

118. زبدة التواريخ. A History from Tymúr to the invasion of Nádír Sháh, by 'abd al-Karym.

Beginning حمد بحد و سپاس بیحد نثار بارگاه عظمت و جلال

E. 272 pp. of 23 lines.

119. واقعات اظفري. Memoir of Mohámmad Tzahyr aldyn Myrzá 'ally-bakht, who was familiarly called Myrzá Gurgány, and had the takhalluḡ of Atzfary. He was descended from the royal house of Dilly, and was alive in 1215.

It commences with the decline of the reign of Sháh 'álam and

contains the memoirs and letters and contemporary history of the author.

Beginning بعد حمد حضرت پروردگار و نعت

Nawáb Mohammad 'ally Khán Jhahhuree, about 300 pp. of 15 lines, at the end the Rékhtah Dywán of Atzfary is added. Another copy of the work is in my possession. "Translation is required from beginning to the end of the Memoirs, consisting of about two-thirds of the whole volume."

120. A History of the Administration of Lord Cornwallis, the wars with Sindhyá, &c. by 'ally Ibráhyim Khán (on whom see my Catalogue I. p. 180).

Beginning الحمد لله على نعمائه وصلوات على نبيه و اوصائه ابن وقايح

E. 82 pp. of 15 lines, another copy, 219 pp. of 9 lines.

121. شگرفنامه. Travels of I'tiqám aldyn to England. He left India in A. H. 1180.

Beginning مستایش و نیایش مالک ملکی را سزد که در ولایت الانهایت جالاش پیک اندیشه انسان

E. small 8vo. 218 pp. of 12 lines, written in 1868 of the Sum-bhat era.

122. Memoirs of Mohammad Faydh-bakhsh, who was six years in the service of Shujá' aldawlah, and after his death twenty-seven years in that of Jawáhir 'ally Khán, and after his death in the service of Daráb 'ally Khán, who died in 1234, as we learn from chronograms from the pen of the author, at the end of the volume.

Bg. بنام خدائی که با تیره خاک بر امیخت این جوهر جسم پاک

'ally Akbar, 962 pp. of 15 lines.

123. تاریخ علی وردی خان. History of 'ally Wirdy Khán.

Beginning اجداد معالی القاب از قوم اتراک بودند و جدش نسبت رضایه با عالمگیر داشت

"I believe this is mine, but forget. I do not remember where and from whom I procured it," 176 pp. of 10 lines.

124. نادر القصص. Memoirs of Gholám Mohammad Khán Sirhindy, composed in 1216.

Beginning من بعد حمد ایزد بی همتا و پس از نعت سید المرسلین

Dilawar-jang of Farrokhábád, an autograph, 238 pp. of 11 lines.

125. عمادة العادات. History of Oudh, by Gholám 'ally Khán, dedicated to Sa'adat 'ally Khán.

نغمه فروشي منقار عندليبان بباد رخسار گلی است که رنگ
وبوي گلهاي بهاري

E. 416 pp. of 15 lines.

126. اوصاف اصف. History of Aṣaf aldawlah and his predecessors, by Munshiy In'ám 'alyy.

Beginning اصف توصف در حکم و منصف صنع و ساختهي ای انکه تو ساختی

E. 215 pp. of 14 lines.

127. تواریخ شاه شجاع الملک. Memoirs of Shujá' almulk Sháh, from 1216 to 1241.

Beginning حمد بیقیاس و سپاس بپسند و شکری انتہا

E. 174 pp. of 13 lines.

128. فتح عبریه. A History of Assam, by Shiháb aldyn Táysy, compiled under 'álamgyr, probably in 1073, and divided into two books مقاله.

Beginning جنود نا معدود و حمد ملازم حضرت مالک علی الاطلاق
است که صف اریان معرکه شریعت

E. two copies, 327 pp of 11 lines, new.

129. تاریخ مبارکشاهی. A History of the Kings of Dilly to Moḥammad Sháh, by Yakyá b. Akmad.

Beginning سپاس بی قیاس مر حضرت خالق حق

E. 262 pp. of 13 lines, new.

130. دستور العمل تو در مل (P.)—The Routine of business, by Tódermal, the minister of Akbar.

It contains an account of the revenue, and in the second chapter the titles of the Amýrs of the court. At the end are the dates of the death of saints.

Beginning نسخه دستور العمل بر آورده تو در مل

Ratan Singh Bareilly, 12mo. 64 pp. of 11 lines, an old copy.

131. شرح آئین اکبری. A commentary on the Ayn Akbary, by Najaf 'alyy.

Beginning ایزدی نیایش سزای بارگاهش نتوان بیان آوردن

E. 460 pp. of 13 lines, copied in 1267 "from the author."

132. کتاب جمعدامی. An account of the revenue of India under Sháhjahán, compiled after 1058.

Beginning الحمد لله والمنة که بافضل و کرم جناب الهی

Nawáb 'alyy Moḥammad Khán, a splendid copy, 424 pp.

133. دستور العمل. This book begins without preface, and contains

an account of the revenue of India (probably under 'álamgyr), at the end are added regulations of the Government.

E. a very valuable copy.

134. دستور العمل. A short History of India, also an account of the Revenue and Administration of India down to Farrokhsiyár.

E. 392 pp. copied in 1848.

135. رساله مناصب. Directory and Court Guide, containing an account of the principal officers, salaries, &c. at the court of Dilly, as they were in former days, by Najaf 'alyy.

Bg. پس از نیایش بارگاه دهشور قرون دهش و بی نیازوستایش ستودگان

E. two copies, about 100 pp. of 11 lines.

136. صوچات هندوستان. An account of the Çábahs of India. "This is nothing more than an extract from the Kholáçat altawárikh."

Beginning تنظیم مملکت سخن دلپذیر و تنذیق معنی بند بی نظیر
باصابت رای دبیرخانه روشن ضمیر

E. 255 pp. of 13 lines.

137. قوانین سلطنت. A treatise on Government, on the arrangement of the king's household, &c. also the praise of Akbar Sháh (succeeded in 1806), to whom the book is dedicated by Iláhy-bakhsh, whose takhalluç is Shawq.

Beginning جهان جهان حمد و سپاس سزاوار حضرت شاهنشاهی که نه رواق
افلاک طاقی از ایوان رفیع البیان عز و جلال اوست

'alyy Mohammad Khán, 128 pp. of 13 lines, copied in 1238.

138. مطلع العلوم و مجمع الفنون (P.) An Encyclopædia of the sciences cultivated by the Mohammadans in India, by Wájid 'alyy, the editor of the Zobdat alakhbár newspaper.

Beginning حمدی که شان خداوندی را شاید از زبان مخلوق

Lithographed, Agra, 1846, 4to. 539 pp.

139. شاهد صادق. An Encyclopædia in five chapters باب. 1, on God, the prophet and religion; 2, Government; 3, intellect and science; 4, love; 5, the stars. The name of the author is Mohammad Çádiq Çálih Ispahány, he was settled at Jawnpúr and wrote this work in or after 1054.

Beginning الحمد لله تعالى ومنه المبدی والیه المنتهی

E. 858 pp. of 19 lines, a fine copy.

140. سیر الملوك (P.) Ethics for kings, being a treatise on the administration of the government of a state by the Khwájah Nitzám

almulk, written at the request of Sultán Sa'yd Mohámmad, a son of Malik Sháh. It is divided into fifty chapters فصل and the subject is illustrated by anecdotes حکایت. He had a fair copy made of it in 485.

Beginning سپاس خدای را عزوجل که افرید گار زمین و آسمان است

E. a fine old copy, 163 pp. of 22 lines, written in a clear hand at Urmyah, in 564.

141. خاتمه جلد دوم از کتاب کنزالمحفوظ. Appendix to the second volume of the work, which has the title of *Kanz almahfút*. This volume contains ethics and history, and was completed in 1188. The history is chiefly taken from the *Tabaqáte Akbary* of Nitzám aldyn Ahmád.

Bg. در بیان دستور العمل سلاطین و احوال ایشان و وزرا و امرا حکام

Mohammad Myán, 356 pp. of 19 lines.

142. *Mirabilia Mundi*, by 'abd al-Karym of Jhajhar, whose takhalluṣ is Moshtáq, and who compiled this book in 1845. It contains the sayings of ancient philosophers, an account of remarkable buildings, of the Qúbahs of India, &c.

Beginning مرات حمد و سپاس بیقیاس تسلیم بارگاه مہدیت

E. 224 pp. of 15 lines.

143. مسافرنامہ جلال الدین محمد. The Travels of the Saint Jalá aldyn Mohámmad, who flourished under Fyrúz-sháh. The book seems to contain very little information.

Beginning مسافرنامہ حضرت قطب الاقطاب شیخ

Nawáb 'aly Mohámmad Khán of Jhajhar, small 8vo. about 80 pp. of 14 lines.

144. عباس نامہ. History of Sháh 'abbás of Persia, from his birth by Táhir Wahyd (see my Cat. p. 137).

Beginning نیایش خالق را سزااست کہ زبان محمدت سگال را از کلمات

Nawáb Dhiyá aldyn Khán, 70 pp. of 12 lines, another copy which has the title of ریاض التواریخ belongs to Ratan Singh. It is much larger, having 570 pp. of 12 lines, and containing an account of the Qafawy kings generally.

145. طہاسپ نامہ. Contemporary History, by Tahmásp. He first relates the history of Persia, then the accession of Ahmád Sháh Durrány to the throne of Qandahár, his wars with Mohámmad Sháh the Marhatta war, &c.

ثدا و حمد بىحد آن خدا را كه پيدا كرد او ارض و سما را

E. 316 pp. of 18 lines.

146. درة نادرة. Modern History of Persia, by Munshiy Myrzá Mahdiy b. Naçyr. It comes down to the accession to the throne at Tabryz of Ibráhym Khan.

Beginning ديپاج ديپاچه كتاب كتاب فصاحت قرين مخطط و مدبج

Nawáb Dhiyá aldyn Khán, 360 pp. of 15 lines.

147. تواريخ قندهار. The History of Qandahár Moḥammad Qandahary. It begins with Kayúmarth and comes down to 1020, by Hájj. Among the sources which he names are تواريخ اصفهان و تواريخ يوناني و تواريخ بادشاه نامه الخ At the end some idiomatic phrases of the Persian language are explained.

Beginning اما بعد از حمد و نعت واضح كه كتابى مبنى احوال شاهان روم 'alyy Moḥammad Khán, 200 pp. of 23 lines, written in 1213.

148. تاريخ پنجاب. A History of the Panjáb, by Ganésh Dás, Qánungúy of Guzrát, compiled about 1849 or 1850.

Beginning حمد خداوندی راست كه ادم اكرم را از كتم عدم بعرضه ظهور آورد

E. 177 pp. of 13 lines, copied in 1851.

149. كتاب راج درشني مشهور بتاريخ جمون. History of Jammú, by Gunésh Dás.

Beginning بعد حمد بادشاهي كه تواريخ اورا

E. 630 pp. of 11 lines.

150. تاريخ پنجاب. A History of the Panjáb, coming down to our days.

Beginning برهوشمندان خبيرو اگاه دلان روشن ضمير

E. 147 pp. of 9 lines.

151. تاريخ پنجاب. History of the Panjáb, by Gholám Moḥyy aldyn. The date, when it was compiled, is stated in a ta'myyat which would give 1269, but there must be a mistake in the calculation; the work is not quite so modern.

Beginning حمد بىحد و ثنائى منتهائى مرخدايرا سزااست كه كريمه رحمتى

E. 1258 pp. of 22 lines, folio.

152. كتاب شش فتح كانكرا. The six victories of Kangra.

Beginning حضرت حكيم على الاطلاق جل جلاله در ازل ازال

E. 96 pp. of 17 lines.

153. كتاب راج تركي. A Persian translation from the Sanskrit of the Raj Tarangini.

حمد ان مبدعى كه عالم جود بست گردش چنانكه بود
كشود الحمد لله رب العالمين والعاقبة للمتقين

E. 114 pp. of 15 lines, a new copy.

154. *واقعات كشمير*. A History of Kashmyr, by Moham-mad A'tzam from the earliest period. The book is rich in biography.

Beginning *صفحات دفتر ابداع و ايجاد تربت طبقا منظر عالم*
كون و فساد

E. two copies, 616 pp. of 15 lines.

155. *تاريخ كشمير بزيان اردو*. Hindústány translation of the Mo-hammad A'tzam's History of Kashmyr, by Munshiy Ashraf 'ally.

Beginning *چونكه ديزولا صوبه كشمير جنت نظير عنایت قادر قدیر سے*
Lithographed, Dilly, 1846, 357 pp. of 85 bayts.

156. *لب التواريخ*. A History and description of Kashmyr. The last date which I observed is 1262. It is divided into two parts.

Beginning *بعد از حمد و سپاس بيقياس مرافيدگار جن و ناس كه*
خالق جميع حيوانات

E. two copies, 240 pp. of 13 lines.

157. *كشمير حال*. Present condition of Kashmyr, by Ganésby Lál, compiled at the request of the Hon'ble Mr. C. Hardinge. It contains also Mr. Hardinge's journey to Kashmyr.

Beginning *برسياحان ممالك فهم و دانش و مساحان مسالك*
خرد و بينش

E. 145 pp. of 15 lines.

158. *تاريخ سند*. History of Sind, more particularly of Tatab, compiled a few years ago. It contains also biographical accounts.

Beginning *بعد حمد احد بچون تعالى جلسانه عما يصفون كه*

E. 485 pp. of 14 lines.

159. *حديثه العالم*. A History of the Deccan, compiled by Abú-l-Qásim in 1214.

Beginning *نظام ملك سخنوري و انتظام قلمرو معني كستري وقف*
سالار حمد شاهنشاهي كه

Lithographed, Madras, 1266, 394 pp. of 94 lines.

160. History of Haydar 'ally Khán of Maysor. We learn from a note in the commencement that the book was composed by Nawáb 'ally Ibráhyim Khán (on whom see *suprà* No. 121). It comes down to 1195=1778.

Bg. *سنایش نامری كه بدد گاري فوج لطفش كشور كشيانرا فتح و نصرت*

E. 80 pp. of 13 lines.

161. کتاب تاریخ خانمان راجهای دهار و دیواس و مهاراج سیندهیه بهادر.
A History of the royal family of Sindhiyah, written in Hindústany,
by Dharm Naráyan of Dilly, who was in 1846 a pupil of the Govt.
College of that city.

Bg. پیش از شروع کرنے تاریخ خاندان راجهای دهار کے ایسا مناسب ہی
Lithographed, Indore, 1850, 40 pp. of 17 lines.

162. لب التواریخ. "It contains an account of the Barha Wazyr."
ساقی ای لعبت سیہ صاف

Beginning
E. 110. pp. of 15 lines.

163. وقایع حیدرآباد. History of Haydarábád, containing the con-
quests of the Moghol sovereigns in the Deccan.

بیان مجمع از وقایع زمان سلطنت پادشاه گیتی ستان
خادمکان ابوالمظفر محی الدین محمد اورنگ زیب عالم گیر

Nawáb Dhiyá aldyn Khán, 74 pp. of 17 lines.

164. حالات راجہ های بھرت پور. History of Bhartpúr, from Ranjyt
Singh to Balwant Singh.

از اینجا کہ بمیا من

Beginning
E. 36 pp. of 15 lines.

165. مخزن الفتح. Treasury of Victories, or contemporary his-
tory, more particularly of the Mahrattas, by the pandit Bhagwán Dás
of Sheópúr. The title is a chronogram for 1222.

نمای صنای کہ سنایش شمع وجود را

Nawáb 'ally Mohamammad Jhahjary, small 8vo. 162 pp. of 11 lines ;
also E. 170 pp. of 9 lines.

166. تحفہ تازه or بلوندنامہ. History of the Rájahs of Benares, to
Udat Naráyan Singh, by Khayr aldyn Mohamammad of Iláhábád.

سپاس خداوندی کہ در ایوان ذاتش

Beginning
E. two copies, 510 pp. of 13 lines.

167. عبرت نامہ بنارس. The History of Wazyr 'ally Khán, by
Mohamammad Hosayn Bhabhány, compiled in 1213 and divided into
five chapters مرحله.

الحمد لله رب العالمین والصلوة والسلام علی سیدنا ونبینا

'ally Mohamammad Khán of Jhajhar, about 150 pp. of 11 lines.

168. جونپور نامہ. The Jawnpúr-námah, a historical account of
Jawnpúr and its buildings, &c., by Khayr aldyn.

باب اول در احوال سلاطین و حکام جونپور

Beginning
E. 87 pp. of 13 lines, written in 1843.

169. وقایع قله اتاره. A History of Etawah, by Munshiy Lachmy Naráyan who was born in 1158.

Beginning ای خوشا دلچسپ مضمون که از تسویدان

E. 35 pp. of 13 lines.

170. وقایع دلپذیر. History of Oudh, from Gháziy aldyn Haydar to Mohámmad 'alyy Sháh, by Mawlawy 'abd al-Ahad.

Beginning ابداری سیوف بارقه السنه کشور کشایان

E. 126 pp. of 15 lines, copied in 1266.

171. تاریخ گجرات. History of Guzrát, from 793 to 863.

Beginning برواقف هوشمند ودانای خردمند بس واضح و روشن

E. 285 pp. of 15 lines.

172. تاریخ گجرات. History of Guzrát, by Abú Toráb Darwysz. It commences with the reign of Sultán Bahádur and ends with Sultán Motzaffar, the last of the Gujráty kings.

Beginning الحمد لله والصلوة على رسول الله اما بعد چون مفت

دوستی خصلتی است

E. small 8vo. 230 pp. of 12 lines, copied in 1151.

173. کتاب گل رحمت. Memoirs of Hafis Ruhmut Khán, surnamed Hafis-ool Moolk, by his grandson Sadut (Sa'adat) Yar Khán of Bareilly.

Beginning ستایشیکه شایان شان الوهیت است

Lithographed 1836 Agra, 221 pp. of 17 lines.

174. تواریح احمد خانی. A poem by Nawal Ráy of Shamsábád in which he describes the career of his patron Ahmad Khán, composed in 1180.

Beginning خداوندی که آرایش جهان کرد

Nawáb Ráy of Farrokhábad, about 500 pp. of 17 bayts, incomplete.

175. مائثر الکرام. Biographies of distinguished Musalmans in India, divided into two chapters, the first contains saints and Cúfies, and the second men of learning, by Gholám 'alyy Azád.

Beginning نسایم الامام ساریته الی الحمی السرمدي

E. 392 pp. of 13 lines.

176. An account of celebrated calligraphers and engravers of Dilly, by Shaykh Gholám Mohámmad. The last date which I observed is 1228.

Beginning رساله متضمن حالات خوشنویسان خطوط الخ

E. 76 pp. of 11 lines.

177. شجرة صوفيان. Spiritual Geneology of the Çufies, from Adam to the year 1137, when the book was compiled by 'abd al-Karym Hamadány.

E. 73 pp. written in a clear hand.

178. فوايد الفواد. The sayings of Hasan 'alyy Sinjary, a saint, taken down by one of his disciples. It commences with A. H. 707 and ends with 722.

Beginning اين جواهر غيبی و اين زواهر الاربيی از خزاين تلقين

E. 306 pp. another copy is in possession of Nawáb Dhiyá aldyn Khán.

179. صرأت مداريه. The History of Shaykh Madár, an Indian saint of great repute, who died in 849 and is buried at Makanpúr (not far from Kannaúj), compiled by 'abd al-Rahmán Christy in 1064. Chiefly from the work of Qadhiy Moḥammad Kantúry.

Beginning الحمد لله الذي خلق الاشيا وهو عينها يعنى

E. who received it from Mr. E. Bayley, about 100 pp. of 15 lines, a good copy.

180. نصرة الناظرين. A History of the Saints of Bilgrám, in the form of a chronicle, the remarkable events connected with them being related year by year up to A. H. 1182.

Beginning الحمد لله محمول الشهور والا عوام ومقلب الليالي والايام

Náḡir Allah, Deputy Collector of Coel, 406 pp. of 17 lines.

181. كتاب گيان گشت ايت. A Memoir on the Kayeth Caste, by Samán Lál in Hindústány, dedicated to Sir H. Elliot.

Beginning سجدہ کرتا ہوں میں اُسکو جسکے يہ دنیا چون

E. 132 pp. of 11 lines.

182. راج سماج. A Hindy treatise written in the Persian character with an Urdú interlinear version on the habits of the Hindus by Sry Rám Singh pandit, dedicated to Sir H. Elliot.

Beginning دريان کبريت يعنے توحيد سرى کبنا جہو کے میں

E. 178 pp. of 17 lines, copied in 1851.

183. "This work is a Pilgrim's Guide to Mekkah," by Safi b. Wali of Qazwyn. The author went on the pilgrimage in 1086. In the Introduction, he describes his voyage from Súrat to Jedda, and in the first chapter the preparations requisite for the sea voyage. 2nd. Sacred places at Mekkah. 3rd. Ditto at Madynah. Conclusion, adventures of the author after

disembarkation and the honours due to pilgrims. The author compiled the book after return to Súrat. Many parts are amusing. The original is in the Lucnow Tópkhánah library, and is embellished with drawings of the temple of Mekkah and Madynah and Carawans, &c."

Beginning الحمد لله والسلام على عبادة الدين اصطفى

E. 256 pp. of 9 lines.

184. شگرفنامه. Account of a voyage to England, and information on various subjects, as the criminal law of the Mahomedans, the compass, &c. by I'tiḡám aldyn, written in 1191.

Beginning

E. 380 pp. of 11 lines, written in 1867 of the Sumbhat era.

185. تذكرة دولت شاهي. The Tadzkirah of Dawlat-sháh, see my Cat. I. p. 7.

Beginning حمیدیکه شاه باز بلند پرواز اندیشه نساخت

E. 584 pp. of 15 lines, a good copy.

186. پدموات. The Loves of Padmáwat, a princess of Ceylon, and Ratan Sén a king of Chitór in Bhaká verses, by Malik Moḥammad Jáysy (see my Cat. I. p. 614).

Beginning سنورون اوابک کرتارو حبه حیدود بهه کهه سسارو

Nawáb Dhiyá aldyn, 328 pp. of 18 lines, a fine old copy.

187. پدموات موسوم برت پدم. Padmáwat, a Mathnawý, containing the adventures of Rat Padam, by Bazmy, who took the subject from the Hindée of Jáysy and composed this poem in 1028.

Beginning اي نام تو نقشه لوح جانها

E. about 300 pp. of 11 bayts, a good copy.

188. شرفنامه محمد شاه بادشاه. A poem in praise of Moḥammad Sháh, by Myr Moḥammad, whose takhalluḡ was Ridhá.

Beginning جهان افرینده خدای تراست

E. 252 pp. of 15 lines, copy of same age.

189. نه سپهر. The seven spheres, a Mathnawý, in 4,506 verses, by Amyr Khosraw, composed in 918.

Beginning خدا را کنم برسرنامه یاد که برینده درهای معنی کشاد

Nawáb Dhiyá aldyn Khán, 342 pp. of 13 lines.

190. مثنوي میر عبد الجلیل. A poem of Myr 'abd al-Jalyd Wásity Belgrámy, who was an ancestor of Azád and died at Dilly in 1137. He celebrates in this poem the marriage of Farrokhsiyar with a daughter of Máharájah Ajét Singh, which took place in 1128. The date of the composition is 1131.

بھاری کرد کل عالم چمن شد Beginning

Nawáb Dhiyá aldyn Khán of Dilly, 90 pp. of 15 bayts. In the same volume is another Mathnawý of the same poet which begins بیا ای خامه ماتم روایت and some poems of Dzawqy, who was also of Belgrám, and a contemporary of 'abd al-Jalyd.

191. جامع الحكایات ولوامع الروایات. Collection of Stories and Anecdotes, by Mohammad 'awfy, compiled in 625 and dedicated to the Sultán Shams aldyn.

It is divided into three parts قسم and each part is subdivided into twenty-five chapters باب. The first treats on the knowledge of God, the second on good morals, and the third on bad moral conduct, and the fourth on cosmography.

Beginning ثنا وحمد مبدعی را که از بدایع

Heirs of Máhárájah Ratan Chand, Bareilly, folio, old and splendid, near a thousand pages of 29 lines, close writing. It contains the fourth part, but "there seems no third kism in this." There is also a copy in the As. Soc. The work is important for history.

192. نوادر الحكایات. Remarkable stories, collected in 1041 by 'abd al-Nabby. They are divided into five books مصیفة and every book is subdivided into 12 chapters باب and the chapters are again divided into مجلس.

Beginning ابتدای کتاب نوادر الحكایات بنام

Sir H. Elliot, about 800 pp. of 22 lines, a good copy, containing, it would appear, only one book.

193. اعجاز خسرو. Inimitable prose of Amyr Khosraw. Bg. هذا الكتاب بفضل الله ذي الكرم اشاعت سحر الصد الجن والنسم.

Nawáb Dhiyá Aldyn Khán, 382 pp. of 19 lines, large folio.

194. رقعات شیخ فیضی فیاضی. Letters of Faydhy, divided into five chapters لطیفه: the first contains letters to the Court; 2nd, to Nobles, men of learning and Qúfiés; 3rd, to Philosophers and Physicians; 4th, to (foreign) Kings and Princes; 5th, to relatives. It also contains an appendix which is divided into three منظومه.

Bg. یا از لی الظهور یا ابدی الخفا نورك فوق النظر حسنك فوق الثنا

Dhiyá Aldyn Khán, an old copy 318 pp. of 13 lines.

195. مجموعه نثر ملا طغرا. A collection of twenty-two essays in flowery prose, by Mollá Toghrá (see my Cat. I. pp. 98, 112, 125.)

Bg. درنرد محبت همه جا حاصل خاک است صد مهرة داغ هر طرف تیرتک است

Nawáb Dhiyá Aldyn Khán, 194 pp. of 15 lines, a fine old copy.

196. نوباه. Elegant prose compositions by Mollá Monyr of Láhór, (d. on Saturday 7th Rajab 1054) composed in 1051 of the Wilaity era.

Beginning این منتخب از بخت فرجامش

Dhiyá Aldyn Khán, about 300 pp. of 9 lines, copied in 1163.

197. احوال فرنگستان. Abd al-Sattár b. Qásim, the author of this book was ordered by Akbar to learn the language of the Firinghees in order to be enabled to translate books into Persian regarding their religion and history, &c. He therefore studied under a missionary whose name is spelled ژیرو نموشویر. The last two syllables most likely present "Monsieur." After a study of six months he wrote this work, which contains an outline of the histories of Greece and Rome, and of the lives of the ancient Philosophers.

Beginning سپاس الهی و ستایش جان آفرین در آغاز نامها

E. 120 pp. of 23 lines, copied in the 19th year of Akbar.

198. طبیات عالمگیری. Critical remarks by Balygh on Mirzá Bydil, Cáyíb, and other poets.

Bg. حمد علیمیکه در لفظ کن معانی تصانیف طبقات مضمرداشتن شان

Dilly College, 42 pp. of 23 lines.

199. نگارستان عجایب. The story of Bahrám Sháh, King of China, by Sa'y'd aldyn, who was commonly called 'alyy Mohammad Khatáhy.

Beginning ثنا کرتا ہوں میں ایسے خدا کے کہ حسن عقل انسانکو عطا
کی اور عالم ایجاد میں عجائب غرائب شکل مختلفہ

E. 124 pp. of 11 lines.

200. نیاز نامہ. Letters and descriptions of Subhán Ráy, divided into three chapters قسم containing petitions or letters to superiors, or equals, and forms of deeds, &c.

Beginning حمد یلحد بحضور منشاء معنی کہ منشی فطرت را در
انشاء ستایش سر بگریبان حیرت است

E. 306 pp. of 14 lines.

201. بہار سخن. A collection of letters and other elegant compositions by Mohammad Çálih Açlah Allah of Dilly, an Amyr of 'alamgyr. It is divided into several chapters چمن.

Beginning ایزد سخن آفرین را سپاس کہ چراغ گفتار

Nawáb 'alyy Mohammad Khán, 444 pp. of 20 lines.

202. ریاضتہ الانشا. "Garden of elegant composition, being a collec-

tion of the letters of Maḥmūd Ġawán گاوآن of the Deccan, a son of Shaykh Moḥammad Gylány.

Beginning یامن توحید بدایع الابداع والنشاء

“He was Wazyr of the Rahmaṇyyah dynasty of the Deccan, particularly of Humáyún Sháh and his son Nitzám, and of Moḥammad Sháh, and died in 885, see *Firishtah* I. p. 689.”

Nawáb Dhiyá aldyn Khán, 367 pp. of 15 lines.

203. بدایع الانشاء. Letter forms composed by Yúsufy for the use of his son Hosayn. The collection is therefore also called *Insháy* Yúsufy.

Beginning زینت عنوان هرنامه نامی و زیور دیباچه هر صحیفه

E. 374 pp. of 13 lines, copied in 1011.

204. گلدسته فیض. Letters and other elegant prose compositions of Bhóran Mal Tamkyn, who resided at Agra in 1807, collected by his grandson Purán Chand.

Bg. غنچه زبان باهتر از نسیم شکر قادری شگفته و خندان است

E. 100 pp. of 12 lines.

205. گلشن بهار. Collection of letters of Munshiy Jaswant Ráy Bahádur.

Bg. نوع بنوع سپاس و گوناگون قدسی اساس قادر مقتدر ذوالجلال

E. 122 pp. of 16 lines.

206. صفات کائنات. Descriptions in prose of various subjects, selected from the most elegant Persian authors, as Amyr Khosraw, Mirzá Khalyl, Mirzá Jalál Tabátábá, Khán Árzú, Shaykh Moḥammad Čáliḥ, Mokhliḥ Khán, &c. Without preface.

Bg. بسمله رنگین کلامی تعریف بسم الهی است که حسن اغاز انوار اغاز
حسن امانی جمهر

E. 620 pp. of 19 lines.

207. کتاب مجمع الصنائع. A work on Rhetoric, by Nitzám aldyn Aḥmad.

Bg. الحمد لله الذي انعم علينا وهدانا الى الاسلام

E. 178 pp. of 15 lines.

208. ریاض الصنائع. “(Printed) Abridgement of Persian Rhetoric with examples compiled by Maharájá Kálí Krishuá Bahádur,” Calcutta 1847, 80 pp.

Beginning حمد لاتحد و سپاس لاتعد پروردگاری را سزد

209. صرأت الاصطلاح. Poetical expressions of the Persian language

explained by Ráy Anand Rám, whose Takhulluṣ was Mokhliṣ. "He was a Khatry of Dilly, and in the service of Sayf aldawlah of Láhór. He left a Persian and Hindy Dywán and is also author of the History of Nádir Sháh's war with Mohámmad Sháh. He died in 1163." (1164?)

Beginning ربنا در مقامی که کرو بیان ملاء اعلیٰ

E. 531 pp. of 15 lines, a fine copy written in 1267.

210. فرهنگ ابراهیم شاهی. A Persian Dictionary by a pupil of Ibráhyim Qiwám Farúqy; (perhaps by himself, and only the preface by the pupil.) The pages being injured, the text is not complete.

Beginning بنام خداوند هستی بدواست

Sir H. Elliot, 800 pp. of 21 lines, an old copy.

211. مفقداح الاخلاق. A Glossary and Commentary on the Akhláqe Náṣiry, by 'abd al-Raḥmán b. 'abd al-Karym of Burhámpúr, compiled in 1085. He says that he found an autograph of the Ethics of Náṣir aldyn Túsy which he had used in his lectures, and after a careful study he wrote this work upon it, which is divided into two parts قسم, the first contains a Glossary, and the second an explanation of verses of the Qorân, traditions, &c. which occur in it. Among the books which he professes to have used are the following كنز اللغات بحر اللغات اصطلاحات الحكماء جامع اللغات لطايف اللغات.

E. 93 pp. of 9 lines, a new copy.

212. دریای لطافت. A treatise on Hindústány Grammar, by Inshá.

Beginning ثنای بی اندازه داور را سزااست

E. 320 pp. of 16 lines, incomplete. This book has lately been printed at Murshidábád.

213. مصطلحات تهگی. A Vocabulary of the Slang of the Thugs, by Munshiy Mirzá Mohámmad 'aly Akbar of Iláhábád.

Beginning حمد و سپاس زیاده اندازه شرح و بیان دیچان

Lithographed, Calcutta 1839. Small 8vo. 197 pp.

214. Rules of Grammar and Vocabulary of the Chaghatay language, compiled by Mohámmad Mahdliyy Tabryzy in 1198.

Beginning حمد و سپاس یحد و قیاس متکلمرا

E. 391 pp. of 9 lines, new.

In the same volume is another work on the same subject by an anonymous author, 261 pp.

Beginning الحمد لله رب العالمین - - بدان اسعدی الله تعالی که کلمات لغات
زبان تورکی مانند عربی برسه قسم است

In the same volume is a vocabulary of the Turkomán dialect, by Ahl aldyn Turkomán, a son of Bayram 'alyy 173 *حمد و سپاس* و ستایش مران معبود را که از

The original of these vocabularies is in the Móty Mažall.

215. *قرة الملك*. A treatise on the veterinary art, translated from the Hindy (Sanserit?) by order of Ghiyáth aldyn Mohammad Sháh b. Mahmúd Sháh Khiljy in 783 (?). It is divided into 12 chapters *باب* and treats on the diseases of horses, &c. and their remedies.

Beginning *الحمد لله رب العالمين والعاقبت للمتقين* - سلان

216. *جواهرنامه*. A description of precious stones and some other minerals, by Mohammad b. Ashraf Hosayny Rostamdáry dedicated to Bábor.

Beginning *حمد بپسند و شكر بپسند حكيمي را سزد كه بموجب خمرى طذت آدم بيد اربعن صباحا*

Ratan Singh, 122 pp. of 15 lines.

217. *بدائع الاسرار*. A medical treatise on tea, coffee and tobacco, by Ahmad Hosayny.

Beginning *سپاس و ستایش و ثنا و ثنائیش مر حکیمی را*

E. 64 pp. of 9 lines, new.

218. *معالجات شافیه*. An essay in Urdú against the infanticide of the Rájputs, by Tafadhdhul Hosayn Khán of Jawnpúr.

Beginning *اشتهار منطبعة گورمنت گزرت اگره مرتبه تواریخ متعدده*

E. two volumes 236 and 95 pp. of 7 lines.

219. *قانون مسعودی*. The Mas'údi's Canon, by Abú-l-Rykhán Moh. b. Ahmad Byrúny, dedicated to Sultán Abú Sa'yd Mas'úd b. Gamyn aldawlah Mažmúd. This is probably the most accurate and one of the largest Arabic works on astronomy. It is divided into 11 books *مقاله*.

Beginning *المسعود من سعد با اله وتفرد بتايدده*

E. A beautiful old copy, folio 516 pp. of 31 lines.

220. *اوله قویه بر عدم جواز کبیسه*. (P.) The strongest evidence of the non-existence of the Kabeesa in the doctrines of Zoroaster, in reply to a work of Hajy Mohd. Hosain Ispahány, published in A. D. 1827 and entitled *شواهد الذقیسه فی اثبات الکبیسه* by Feroz b. Mollá.

Beginning *سپاس نامحدود و غایت و نیایش*

Bombay 1828, large 8vo. 223 pp.

221. *تصویرات طیور*. Very valuable drawings, with names, in Persian, of birds used in hawking &c.

تصویریہ باز فانی کہلاتا ہی خالی نام ہریشکے تشریح یہہ ہی

E. 92 pp.

222. توصیف زراعت. The manner in which agriculture is practised in India, described in Hindústány by Kalb Hosayn Khán.

سزاوار حمد و سپاس وہ خالق یکتا ہی

Lithographed, Agra, 1265, 270 pp. of 14 lines.

Notes upon the Geology of the Rajmahal Hills ; being the result of Examinations made during the cold season of 1852-53.—By THOMAS OLDHAM, Esq. F. R. S. (Communicated by the Beng. Govt.)

The researches of the Geological Survey were directed during the working season of 1852-53, to the examination of the Rajmahal Hills, and portions of the adjoining districts.

The “Rajmahal Hills” form a comparatively isolated group of low, flat-topped hills which extend from the borders of the district of Beerbhoom, on the South, to the banks of the Ganges on the North. The general direction of the range is North and South.

Near their southern extremity the hills are divided by the valley of the Brahmini Nuddi ; which flows from West to East through the range, and forms the southern boundary of the Damin-i-koh or Government Territory. North of this, the Puchwara pass, or the valley of the Bansloo Nuddi, passes right across the general direction of the range ; and completely divides the hills. Still further North, the high ground is intersected by the Chuperbhita pass, which has a general North-Eastern direction, and further north by the Mujhwa, or Moorcha pass, which runs South of East ; these two passes unite with the great valley of Burhait and Burio, which stretching North and South for more than 15 miles, is connected with the plains of the Ganges on the East, by the low ground around Ghutean and Mohobutpoor through which the Goomani Nuddi passes.

This nearly isolated group of hills no where attains any great elevation ; the highest tops scarcely exceeding 2000 feet, but present

throughout very picturesque and varied scenery. A large area of their surface is still clothed with forest jungle, but a considerable portion has been brought into good cultivation by the Sontal settlers, as well as by the aboriginal hill-men.*

Of the mineral structure of these Hills, the earliest notice was that of Dr. Buchanan,† subsequently some detached papers in the current periodicals, and the report of the Coal and Iron Committee were the chief sources of information regarding their geological composition. Recently (1851) Capt. Sherwill has published Notes of a tour in these hills‡, in which he gives a good general sketch of the tribes inhabiting the hills, and some passing allusions to their geological formation. Of a small portion of the southern end of the range, Dr. McClelland gave a Map and description in his report for 1848-49.

The statements of these authors, the occurrence of a number of detached localities in which Coal had been stated to occur, especially along the western flank of the hill range, the possibility of these coal-beds proving only a continuation of the valuable beds of the Damoodah valley, the importance of determining, even though unfavourably, the true value of such deposits, and the fact that Sukrigully (at the North-Eastern corner of the Hills) had been indicated as a locality likely to prove favourably situated for the manufacture of iron, all rendered a careful examination of the district desirable. An abstract of the results of this examination is now given.

The Revenue Survey Map of the district, (a tracing of which we procured through the kindness of Captain Thuillier, Deputy Surveyor General) not being lithographed, it became necessary to construct working copies from the tracing, and again to transfer the geological information. Further, these Maps being prepared and published by separate Pergunnahs, while geological districts are totally irrespective of such fiscal boundaries, considerable delay unavoidably oc-

* It appears to me quite erroneous to view this range of the Rajmahal hills as in any way a part of the great Vindhyan range, the true termination of which to the N. East is in the Curruckpore hills, near to Monghyr. They are entirely distinct in topographical position, in general direction, and in geological structure.

† Gleanings in Science, vols. 2 and 3.

‡ Journal of Asiat. Soc. Bengal, No. VII. 1851.

curs in the compilation and preparation of Maps, on which to record the geological observations. Further, these Maps, being prepared for special purposes, and seeking only to determine with accuracy boundaries and contents (which they do most satisfactorily), are, as regards the physical features of the country, quite insufficient in detail for any careful geological examination. Of the interesting district of the Damin-i-koh, all the topographical features were sketched anew, and quite independently, as we proceeded.

The examination of the many fossils procured, is still progressing, and the final result of their comparison will be given hereafter, with more detailed geological descriptions.

The geological structure of the Damin-i-koh, is very distinct from that of the adjoining district to the West and South, although essentially connected with both.

The gneiss rocks, micaceous schists, hornblende rocks and schists, and granite, which form the great area to the West, extend continuously into the Damin-i-koh, and pass under the more recent rocks which there occur. Along the western flank of these hills, they stretch with a very irregular outline, and extend for some distance within the boundary of the Government territory. These schistose and gneissose rocks are generally tilted up at high angles, in many places much contorted, but on the whole (within this district) they have a remarkably persistent direction and dip; their foliation planes striking from 25° to 45° East of North; and the dip varying from 40° to 85° to the N. W., occasionally they are perfectly vertical, and in a few instances, the dip is reversed; or to the South East.

Associated with the gneiss, which is the prevalent character of the rocks, are numerous beds of hornblende slates and rock, sometimes of great beauty, the hornblende being of very dark bottle-green colour, and highly crystalline, and the felspar of a pure white, or of a light epidote green colour; numerous veins of largely crystalline, and felspathic granite pierce through these rocks, and ramify between and across the foliation. In many cases these veins are exclusively composed of felspar and quartz; the felspar generally of a pinkish or flesh tint, the quartz of a dirty white. Frequently the mode of arrangement of the crystalline masses of these minerals, produces a beautiful and curious graphic-granite.

The gneiss is, generally speaking, deficient in mica; occasionally it has a granular quartzose aspect, and in other cases is highly crystalline and in thick masses or beds, so that excepting for its distinctly laminated character, it would be considered a granite (Telobad, Rajabhita). This massive variety projecting in well marked ridges across the country, is often split up by joints into nearly columnar masses, the ridges when thus divided, having, when seen from a little distance, much the aspect of huge walls of cyclopean masonry, while some of the masses, standing up singly, look like sepulchral monuments.

These rocks being essentially a portion of the great primary district to the West, will more appropriately be treated of in detail in connexion with that area.

Within the boundary of the Damin-i-koh, they stretch irregularly from near Bhoktahn Hill, on the southern boundary at the Brahmini river, by Katticoon, Nargunjo and the western flank of Muhooagurhe hill. Here the boundary turns to the East into the Puchwara pass, up which they extend to the village of Salungi, for about four miles, From this, winding Northwards and Westwards round the base of the Hill of Burgo, their outline again stretches into the Hills, some miles East from Bokrabandh; passing East of Chundna, of the large Sontal village of Soonduree, and extending into the Chuperbhita pass for some distance. In this part of the Damin-i-koh they cover an area of at least six miles in width from the boundary.*

From the Goomani Nulla in the Chuperbhita pass, the eastern boundary of these rocks passes in nearly a right line to near Kurmatanr, where they are covered up by the sandstones of the coal-bearing group.

North of Kurmatanr, they again cover a large area within the Damin; stretching from this with an irregular outline to the west of of the Hurra coal, and skirting the remarkable hill of Gundesree to the West, they pass northwards with a slightly curved boundary into the district of Munni-haree.

Independently of this large area occupied continuously by these

* An excellent little map of this district will be found in *Journal Asiatic Society of Bengal* No. VII. of 1851 accompanying Capt. W. Sherwill's paper.

rocks, along the western escarpment of the Rajmahal Hills, similar rocks are found in detached basins, covering several square miles of area, near to Gopikandur and Dubrajpoor,* and again in a similar detached position encircled on all sides by the sandstone and trap rocks, near to and North of the village of Dhumni in the Chuperbhita pass.

Throughout all this area, where these rocks are uncovered, the soil resulting from their decomposition, as might be expected, is poor and sandy. Frequent deposits of kunkur occur overlying these rocks, and where this is the case, the soil is often good and productive. The greater portion of the district is tolerably level, broken up by the small projecting ridges of rock, and is thickly populated. Dotted over with the large and fine sal trees left by the Sontals in their clearings, and varied by the masses of rock whose dark ridges beetle over the richly coloured patches of wood at their base, this district affords some of the most pleasing, and perfectly park-like scenery in the Damin-i-koh (Katticoon, Rajabhita, Simr) wanting only expanses of water, to render it most beautiful.

Resting upon the upturned edges of these old rocks, quite unconformably, comes a series of conglomerate, sandstone, and shaly beds, with occasional developments of coal, and of ironstone. This group of beds stretches with some interruption from South to North through the whole range of the Rajmahal hills, no where, however, attaining any great thickness, or covering any great area. In this series, occur the several beds of coal, which have been noticed by several authors, as existing in this district.

The series consists of alternating beds of conglomerates, pebbly sandstones, and quartzose grits, of earthy sandstones, and shaly beds, with occasional beds of bituminous shales and of coal. The prevailing colour is white or yellowish-white, occasionally brown, and ferruginous, with a few beds of a deep red colour. As a whole they are very felspathic, the pebbly beds being generally of pure quartz in a felspathic cement: some of the beds are composed almost entirely of decomposed felspar. In several places the beds near the junction of the gneiss and other crystalline rocks consist of scarcely worn or rounded fragments of these rocks, in a granular cement,

* Coloured as coal measures in Dr. McClelland's Map : Report 1848-49.

clearly pointing to the source from whence the materials forming these conglomerate and pebbly beds, had been derived.

Rejecting, for the present, the consideration of the occurrence of coal at the Motijhurna Falls, near to Sikreegully, at the N. W. corner of the Rajmahal hills; (and which it will be seen belongs to a slightly different period); all the localities in which coal has been found in this district, occur at intervals along the western escarpment of the hills, or at least near to this. The rocks associated with the coal rest invariably on the old gneissose, and primary schist rocks, for the most part dipping at low angles, or nearly horizontal, and are in all cases covered up, (and not underlaid) by the great overflowing sheets of trappean rocks, which form the larger portion of the hill district.*

Of this coal-yielding series of rocks the lowest beds in the district are those which occur in the vicinity of the southern boundary of the Damin-i-koh district, near to the villages of Mussinia and Dhmunpore. The series here consists of alternating beds of shales, sandstones, conglomerates, &c. and a few thin layers of iron-stone. The sandstones are generally of a greyish white colour derived from the admixture of carbonaceous particles, with the grains of quartz and felspar which compose the mass. Occasionally the beds are stained of a deep red from percolation of peroxide of iron; and some of the shales also are of this tint and character. The iron stone is of good quality, but of no thickness, and occurs principally in nodular masses, in the dark shales. In some of the beds of shale, thin partings of coal occur, and these beds are occasionally so intermixed with bituminous matter, that they would burn freely, although not blazing.

In the Mussinia beds, there is no seam of coal worth working.†

* A reference to Dr. McClelland's sections of the lower or southern part of the Rajmahal hills, will show how completely we differ from him, in respect to these rocks, he representing the trap *as in all cases beneath the sandstones with coal*. A few, very few instances of dykes of trap, cutting through these rocks occur; no instance as far as I know, of a sheet or mass of trap underlying them.

† Just beyond the boundary of the Government territory, near to Mussinia, very tolerable coal is seen in the bed of a small nullah near the village of Hurrinsingh the true coal seams are not very thick, but they are separated only by highly bituminous shales, much of which could be profitably used, and which could be economically raised.

Similar rocks occur to the west of Mussinia, near the village of Dhmunpore. In these, the coal beds are a little thicker, but too poor in quality to be workable with profit independently of their very close proximity to the gneiss, and granite rocks, which renders the amount of coal and its extent uncertain.

Encircled by the overlying trap rocks, a similar series of alternating beds of sandstone, shale, and shaly sandstone appears in the valley of Dubrajpur and Gopikandur; here also found resting upon gneiss, and shistose rocks. The *coal* of this locality occurs in thin beds much mixed with earthy matter, and is of very inferior quality. In fact, it is nothing more than a bituminous shale.

The sandstones extend on the south to Saldaha, and thence to near Katticoon, where they are supported by the gneiss, as in other places. Here also thin beds of coal are found, but none of these afford any prospect of becoming a profitable source of fuel.

From this, the sandstones sweep round the slopes of the hills on their western scarp; and curve round the base of Muhooagurhe hill into the Puchwara pass; in the valley of which, there is a large area covered by these rocks, in which some beds of tolerably good coal occur, (*Burgo*). Again from the Puchwara pass, these sandstones and shales skirt the western flank of the hills, northwards to the Chuperbhita pass, preserving on the whole, a tolerably persistent lithological character. Here also, near to Chuperbhita, thin beds of coal are found.

Stretching still northwards, with some little interruption in their continuity from faulting, these sandstones cover a large area to the south of the range of Gundesree, where the coalpits (sunk originally by Capt. Tanner) near to the village of Hurra, are situated. North of this, the great flats of Munneehari and of Bhaugulpore commence, and no rocks are visible.

Independently of this continuous range of the sandstones on the west of the Rajmahal hills, there occur several detached areas of these rocks within the hill district, which will be described more in detail hereafter. Although of great interest in a geological point of view, and as connected with the history of the formation of the rocks of these hills, these are of little economical importance.

Resting upon, and covering up these shales, sandstones, and coals,

there are immense overflowing sheets of basaltic and other trappean rocks, which have spread above the sandstones, and passed over them in a molten state intensely altering the rocks, into contact with which they have come, baking them into porcelanic and glassy masses, and producing great and important changes in their aspect and texture.

These trappean rocks of varying character and composition compose the surface rocks of nearly two-thirds of the whole area of the Damin-i-koh : stretching continuously from south to north, forming the highest ridges, as well as some of the lower valleys ; and impressing on the district the peculiar character of its scenery and aspect. In mineral composition, they vary from dense, close-grained, almost compact, and vitreous basalt, to perfect pumice ; the greater portion being of a dense and crystalline basaltic trap ; slightly vesicular, occasionally abounding with olivine, and sometimes with glassy felspar.

In structure also, these rocks present every possible gradation from the most perfectly prismatic and columnar forms, with interlocking joints, to the most homogeneous claystone, in which no symmetry of structure can be perceived. In some of the more massive varieties, the concentric spherical structure, so frequently noticed in trappean rocks, is remarkably well seen.

These old lava masses have been poured out at intervals, in many successive flows ; and have, as might have been anticipated, been irregular in their distribution over the surface ; although one fact, which most forcibly strikes the observer is the remarkable persistency in character, texture, and composition which prevails throughout the entire area from north to south, over a district of some seventy miles in length, and thirty miles in breadth.

In all these traps, there is a *comparative* absence of that great group of minerals, the zeolites, which in other large districts of the same character are so common and abundant. Of this group natrolite occurs in minute acicular crystals not uncommonly, but I have never seen it of any great beauty. Stilbite and Heulandite are also found (Karodih, Amrapara, &c.) ; and in some of the floors abundance of the chlorophaite of Macculloch. But the minerals, which in the majority of cases occur filling or lining the vesicles of the amygdaloidal varie-

ties are agate and quartz. These occur in great beauty and variety, of every size, from a mere point to some feet across; forming a thin coating on the surface of the vesicle, or partially or entirely filling the cavity. In the majority of cases, these cavities have a thin coating of natrolite immediately adjoining the trap, inside which the agates have been formed. The quartz, when it occurs, is generally the innermost or last deposited mineral. There has often been a repetition of these layers of agate, and quartz. In colour, they are generally white, or smoke-coloured; occasionally the agate layers have a red tint, while the quartz crystals are sometimes, though rarely, of a beautiful amethystine tint, (Burhait.) The agate occurs in botryoidal, reniform, and mammillated groups, and some very beautiful specimens have occurred.

Connected with these trappean rocks is one of the most interesting facts in the geological structure of the hills, bearing on the question of the mode of their formation, and evidencing the long continuance of the ancient volcanic forces which have produced these immense flows of molten matter.

The fact of these trappean rocks in all cases *overlying*, and altering the sandstones, associated with the coal beds has already been stated. But, resting upon these lower traps, and bearing all evidence of having been quietly deposited upon them, occurs again another series of beds of sands, and gravels, and of clays and muds, never attaining any very great thickness. These again have been invaded by, and covered by, another flow of trappean rock or lava, and above this again, the same facts are repeated, beds of shales and sandstones and clays occurring again and again, covered up by another sheet of now-crystalline basalt. And this remarkable fact has been in one or two cases distinctly repeated three or four times. In all these instances, the *lower* beds of the mechanical rocks are unchanged, and present their normal character of loosely aggregated sandstones, pebbly sandstones, or laminated clays; in some cases consisting largely of the disintegrated debris of the rocks on which they rest: while with equal constancy the upper beds are in all cases greatly altered, indurated and affected by the mass of lava-like rock which had been poured out over them. The evidence is perfectly clear, that during a very considerable period of time, forces, analogous to existing

volcanic forces, were in most active and powerful operation, some where within, or near to the district, now forming the Rajmahal hills; that these forces were exerted at successive intervals after periods of repose, throwing out immense flows of molten lavas; while during these periods of repose, the deposition of clays, gravels and sands, arising from ordinary causes continued to proceed. And that these intervals were sufficient to admit of a growth, and in some cases a luxuriant growth, of the plants then existing to take place.

In these upper beds, no coal has been found, but that the conditions for its formation still existed, is evident from the frequent occurrence of thin layers or beds of bituminous shale; and in several cases of carbonized stems and fragments of plants. In many of these beds, the vegetable remains are very abundant, and furnish a most important link in the chain of evidence determining the period of the formation of these rocks.

A few of the more remarkable of these fossils were figured by Dr. MacClelland, and described in his report (1848-49,) under the names of *Zamia*, *Taniopteris*, &c. He referred the beds in which they occurred to the epoch of the Oolitic rocks of Europe, and distinguished them altogether from the beds with which coal was found associated, which latter were referred to the coal measure epoch. So far as his researches extended, this conclusion appears justified. But a more extended examination of the district proves that these so-called *Zamias*, (*Ptilophyllum* of Morris,) are associated in the same beds with fossils hitherto only found associated with the supposed carboniferous rocks of Dr. MacClelland's report. (*Taniopteris*, *Pecopteris*; *Glossopteris*, *Zamia*, and *Vertebraria* being all found in the same beds.) This is an important fact bearing on the determination of the long unsettled question of the true geological era of the Bengal coal-yielding series of rocks.

Some of these *Zamia*-like fossils from the Rajmahal district appear, so far as can be determined from a comparison with drawings alone, to be identical with the fossils found in Cutch and described by Professor J. Morris in the London Geological Transactions Volume V. under the name of *Ptilophyllum*; and which Cutch fossils are associated with many other organic remains (animal as well as vegetable) which appear to be unquestionably of the Oolitic

date. In this district no animal organic remains have been found ; but these Ptilophylla occur abundantly, associated with several other fossil plants hitherto only found in the beds associated with the coal of Bengal.

There is, however, a well marked distinction to be drawn between these beds. Although, as we have stated, these fossils are found associated in the same beds, and thus prove the existence of the plants which they represent at the same time, still they are not *commonly* so found together, a prevalence of the Ptilophylla or Zamia-like group characterizing the upper beds ; a prevalence of Vertebraria and of its associated fossils characterizing the lower group. While, therefore, the whole series appears to belong unquestionably to the same great formation, a distinction into upper and lower series, may justly be drawn.

So far therefore, as present evidence goes (and to the same result the analogies of the fossils discovered in the Burdwan coal field point) *the entire group of the coal-producing rocks of Bengal proper,* would appear to belong to the same great geological era, as the extensive formation of the Oolites of Europe ; and to be essentially distinct from, and of more recent date than the true coal measure series (of Europe).*

I doubt not that the further examination of the undoubtedly Oolitic districts which are known to occur at intervals across the central part of India (Bundelcund, &c. &c.) will enable the accuracy of this conclusion to be fully and satisfactorily tested, and will throw much light on the succession of rocks in India, a point as yet in considerable obscurity.†

Above all the rocks noticed before and in many places forming a considerable thickness on the tops of the highest ridges, occurs

* I include here the Damoodah and Adji coal field ; the Ramgurh coal fields described by Mr. Williams, the Kuhurbali coal field, described by Dr. McClelland ; the Rajmahal hill coals and a few isolated patches which occur between. Regarding the coals of the Soane Valley I have no information.

† Some of the fossils we have found have a triassic aspect and probably indicate a period, a little more ancient than the oolitic. Unfortunately we have as yet nothing but vegetable remains, the conclusions derived from which, must always be unsatisfactory.

a remarkable vesicular, and concretionary conglomeritic rock, highly ferruginous, and in many places so charged with peroxide of iron that it can be used as an ore of iron. It frequently stands up in high, steep, and boldly projecting cliffs, and though traversed by many joints is so coherent, that it breaks off in huge masses of many hundred cubic feet, found at lower levels on the hill sides, while the smaller, more broken and more rounded masses, are scattered over the surface of the country. This curious rock is in some cases associated with and passes into irregularly bedded hard ferruginous sandstones, but generally speaking the whole thickness is of the conglomeritic structure noticed above. In it occur, sharply angular as well as rounded (slightly) pieces of sandstone shales, pebbly grits, &c. all identical with those which occur *in situ* beneath it in the series. Many of these are derived from the altered shales, and sandstones below the trap. The general aspect of this rock when weathered, is exceedingly rough and scoriaceous; but on a fresh fracture the mass has all the concretionary semi-crystalline semi-vesicular aspect of the well known nodules of kunkur. In a few cases it is calcareous as well as ferruginous, and then the resemblance is even more striking. It is in fact an iron-tufa due to similar causes, and presenting exactly the same general character, as ordinary calcareous tufa, save that it is ferruginous instead of calcareous.*

Along the flanks of the hills many detached, and in some cases rich, deposits of kunkur occur, which are however no where worked for lime. At Sukri-gully on the banks of the Ganges, where this kunkur occurs in a tolerably regular bed, in addition to the detached concretionary nodules and strings disseminated through the red stiff clay which overlies it, it is worked to some extent for the manufacture of lime. The same deposit under precisely similar circumstances, shews at the projecting point on the Ganges near to

* This is the rock called *Laterite* in Capt. Sherwill's papers and Dr. MacClelland's reports. It were well that this term (laterite) were either abandoned altogether, or were more strictly defined in its application. It has been used as applying to rocks so altogether distinct both in character and age, that it is useless as a definitive term, and its original application to a clay has been quite forgotten or overlooked.

Tegrogunj, and here also might be economically valuable. In the northern part of the hills near Simuria a mass of calc tufa* passing into nodular kunkur is found, in one of the valleys intersecting the hills, and similar deposits occur in several other places, stretching all along the western flank of the hills. And in some places thick and extensive (Chuperbhita pass, &c.) deposits of nodular kunkur cover the low broken ground at the base of the hills.

ECONOMICAL PRODUCTS.

The occurrence of beds of coal associated with the sandstones of this district has already been noticed above. Of the localities where the mineral was known to occur in 1851, Captain Sherwill has given a list† enumerating thirteen. Of these at least eight are utterly useless as productive sources of coal, in some coal does not exist at all, while in others bituminous shale only occurs, of no use as a fuel. In addition to the localities mentioned in this list, on the revenue survey map of the Damin-i-koh, as well as on the index map of the Bhaugulpore district, "coal" is marked as occurring a short distance north of Kooskira, at the eastern extremity of the Puchwara pass. There is however no trace of coal in this locality.

Of those places which offer any promise of producing useful fuel, the Brahmini Nuddi, on the south of the hills; the districts of Dubrajpore to the north of this, of Burgo, in the Puchwara pass; and of Hurra in the northern part of the hills, are alone worthy of any detailed notice.

In the Brahmini Nuddi, coal is found close to Mussinia in thin beds of very slaty character. None of these beds exceed two feet in thickness and the best of them contain at least 50 per cent. of shale or earthy matter; the true coal seams not being more than a few inches in thickness. At Dhomunpore some three miles to the west of Mussinia a bed of slaty coal, a little more than two feet thick is found. It is of superior quality to the Mussinia coal, but still earthy, and its small thickness and position make it scarcely worth working.

In the vicinity of Dubrajpore several thin beds of coal occur, all

* The "bed of fresh water limestone" of Capt. Sherwill.

† Notes on a tour in the Rajmahal hills, *Journal Asiatic Society, Bengal*, No. VII. of 1851.

slaty, and inferior in quality, and of no thickness. The coal rocks here rest so immediately upon the gneiss, and are of such inconsiderable thickness, until they become covered up by the trap above, that there seems no prospect of any profitable coal beds being found.

To the east of the Koondapuhar a thin bed of black shale with minute threads of coal through it, is found.

Were every locality where such occurs stated numerically in a list of "coal localities" it would be an easy task to quadruple the number elsewhere given. It is, however, altogether a misapplication of terms to apply the word coal to materials which would themselves require a considerable amount of extraneous fuel to maintain combustion.

By much the most important locality where coal has been found in these hills is in the Puchwara pass, near the village and hill of Burgo; which was first brought to notice by Mr. Pontet in 1844: not only is the coal found here of better quality than elsewhere in the hills, but there is also a larger quantity of it.

The section as exposed in the Banslooi Nuddi shews a succession of thin beds of coal, and shaly coal from six inches to two feet thick, with black shale, and grey carbonaceous sandstone and shales, to which succeed (descending) coarse pebbly grits, shales, coal (18 inches) sandstone shales, and bituminous shales with threads of coal and thin seams not more than one to two inches, and coal 2 feet 8 inches. Then comes a series of beds of shales, sandy shales, clunch and sandstones, with 3 layers of coal of different qualities included, none exceeding 6 inches, attaining a thickness of about 45 feet thick under which we have black shales, with coaly partings, viz :

Coaly shale and coal,	1	0		
More earthy shale,	0	9		
Coal,	1	3		
Shale,	0	7	3	7
<hr/>				
Grey shales,	0	9		
Ditto shaly or clunchy sandstones,	1	6		
Hard carbonaceous sandstones passing downwards into gritty beds,	4	6		

Black laminated shales full of fossil leaves (<i>Glossopteris</i> , &c.)	0	9
Coal and coaly shale	1	0
Black sandy shale thinly laminated,	0	10
Coal rather shaly, but good,	1	6
Shale, grey and ferruginous with <i>Vertebraria</i> , &c.,	0	3
Coal, with earthy partings,	4	3
Blackish bituminous shale (fossils)	1	6
Sandstones, grits, and conglomerates with a few layers of shaly beds extend from this to the junction of the conglomerate and gneissose rocks, about,	50	0

From this section it will be seen that there is a considerable amount of coal in this locality, and of very tolerable quality. That there is no bed of any value below those seen, is obvious from the proximity of the old primary rocks, while the occurrence of the great flow of trap above limits the series in that direction. The beds are slightly rolling, but as a whole have a very slight dip to the N. E. and although the rocks are not well seen in the valley to the north of the intervening hill of Burgo, I am satisfied that the coal seen there is one of the same beds as occur in the Bansloui Nuddi, and that the series is continuous under that hill. The depth of this covering of trap rock by preventing the sinking of shafts would prove a serious difficulty in the economical extraction of this coal. And, at present, its distance from any economical means of conveyance would render it expensive to bring to market. I believe there is a fair prospect of a considerable amount of useful fuel being found here, and such as would amply suffice for any local demand, although perhaps it could not be profitably brought into competition with other coals more favourably circumstanced.

The beds of coal stated to occur in the Chuperbhita pass, are altogether useless as sources of fuel. Other beds of coal of greater thickness and better quality occur about a mile south of the Goomani Nuddi, near to the village of Sulda, and between it and Jhupani. Here there are two beds each 3 feet thick (including the shaly partings,) associated with thick bedded massive sandstones. The floor of one of these beds of coal is white earthy sandstone, and its roof sharp grits; the other (the lower) is also covered by earthy whitish sandstone, but rests upon a blackish carbonaceous

grit. In their associated beds, in the prevalence of thick massive sandstones, as compared with the constant repetition of successive beds of shales and sandy beds, the group of rocks here differs materially from the Burgo beds. Judging from mineral character, (for unfortunately there is no continuous section;) they seem to belong to a higher portion of the series and to be in the general section above the Burgo beds. The coal is all earthy.

Passing northward now to the Hurra field, we find a very considerable amount of coal, but of a very inferior quality close to the surface. Here Capt. Tanner sank some pits to ascertain the value of this coal, and more recently Messrs. Duncan and Sweedland, I was informed, sank a pit to some 60 feet in depth, but did not succeed in finding any beds, other than those visible at the surface, or rather exposed in the bed of the little hill stream adjoining. Indeed the close proximity of the gneiss rocks to the east (within 150 yards of the spot) might have led to the anticipation of such a result. This pit gave a section of

Alternating beds of shaly sandstone and shale,	9	0
Coaly shale and coal,	4	6
Mudstone, with coaly partings,	2	6
Coal or coaly shale,	2	0
Mudstone as before,	1	0
Sandstones of different degrees of hardness,	30	0
Sandstone and shale.		

There is above these beds, another bed of the same coaly shale, or coal, but none of these afford coal of any good quality, there being in all at least 60 per cent. of earthy matter or shale. For such purposes as burning lime or bricks this fuel might be turned to profitable account, although for the ordinary uses for which coal is employed, it would prove an inferior fuel. The extent of it is, no doubt, considerable, dipping with a slight inclination to the East and N. E.*

* In a subsequent communication, dated 15th Feb. 1854, the value of these coal beds in the Damin-i-koh, as likely to produce an abundance of good useful fuel for the purposes here indicated (burning bricks, lime, &c.) and, as possibly on more extended investigation, and on being opened out more fully, proving of better quality and of greater extent, than judging from the portions now seen,

At the Motijhurna falls, near to and south of Sukri-gully the same gentlemen, as I was informed, sunk a pit in search of coal. There could have been no previous examination of the adjoining country; as the slightest investigation would have shewn the utter futility of such an attempt. The hill is composed of successive sheets of columnar and massive trappean rocks, between the flows of which, as has been stated to be the case commonly, occur thin deposits of shales, and sands, in which are imbedded stems, and fragmentary pieces of plants. A subsequent flow of molten lava passing over these, has charred the stems, has baked the mud into hard shale, and has indurated the irregularly deposited patches of sand into a hard semi-vitreous sandstone. The same phenomena are twice repeated; but the whole thickness of the intercalated mechanical deposit does not in either case exceed a few feet* while below are several hundred feet of nothing but basalt. It is difficult to conceive how any discovery of coal could have been anticipated in such a locality.

In many places throughout the hill district, iron is smelted in the same rude way as in the adjoining districts. The source of the ore used, is almost invariably the highly ferruginous sandstones which occur, as noticed above, at the top of the series beneath the trap rocks. Some of the beds of this sandstone or rather some portions of the beds, are very highly impregnated with peroxide of iron, both

they appeared to be, was more fully insisted upon. The most promising localities were indicated, and the peculiarly favourable combination of circumstances at present existing for working such beds from the great demand for coal for the heavy railway works in the neighbourhood, was alluded to. It was strongly urged that every encouragement should be given to such undertakings, and in accordance with these views the officer in charge of the Government territory of the Damin-i-koh has been instructed by the Government of Bengal, through the Board of Revenue to facilitate such enterprizes in every way in his power, and on most liberal conditions.

* There are only two falls here, not three, as stated, and these beds of shale, &c. occur at the bottom of each fall. One of the indurated patches of sand, has from some rude resemblance which it presented, been said to be a *fossil head of a rhinoceros*, without apparently the slightest consideration of the extreme interest which would attach to the finding of such a fossil in this locality, as elucidating the geological date of the rocks in which it occurred.

disseminated, and investing the grains of the rock, and also forming thin coatings on the fissures and joints. The so-called laterite of these hills, (see above) is also in one or two places used as a source of the iron, but the other is preferred.

The large and widely spread heaps of scoria and slag, the remains of former workings, evidence the extent to which this smelting of iron has been formerly carried on, and this in many places where no trace of such furnaces now exist, and where no tradition of their former existence can be discovered.

The crude or cutcha iron, produced, as is ordinarily the case, in small hemispherical lumps, or blooms, is either used for the supply of the local workmen, who employ it in the manufacture of the few agricultural implements required in the district, or it is sold to dealers who carry it away to Jungypore, Moorshedabad, and other marts. The iron is all wrought by Kols, who live quite distinct from the Sontals, or the hill men, and constantly migrate in pursuit of their labour. The operations are carried on in these hills on the smallest scale, and with nothing approaching to the regularity of system which characterizes the same manufacture in the large iron working villages of the adjoining district of Beerbhoom. Nor is there, I think, any prospect of this manufacture being so extended, as to become available for the supply of any large demand. The ore is too much scattered over a great area, ever to suffice for operations on a large scale. At Sukri-gully, which had been indicated as a locality favourable for the manufacture of iron, not even this rude, and limited native system of operations is carried on. And there does not appear the slightest ground for supposing that there exist in that vicinity conditions favourable for such a manufacture.

But while satisfied that there is no prospect of obtaining from this or the immediately adjoining districts any large supply of cast-iron or of iron adapted for large works, I am equally certain that considerable improvements could be made on the present rude system of working; still keeping in view the production of malleable iron by a single process, as at present. A single and very simple improvement in the mode of expressing the large amount of slag, which comes from the hearth mixed up with the spongy metallic mass, would in itself add much to the value of the iron; and coincidently with this

some improvements on the blast used and the mode of producing it, would be needful. The immense loss which occurs in refining the first smelted iron, or as they say making it *pucka*, a loss which amounts often to fully one-half of the entire weight, at once points out the great want of such improvements : while the excellent quality of the iron obtained, and its admirable adaptation for many purposes are unquestionable.

Beds of fine siliceous clay, which with proper treatment would yield excellent fire bricks and crucibles, and prove an admirable material for the manufacture of many useful articles of hard pottery, occur in several places. This clay is white, with a slight pinkish or grey dove-coloured tint ; burns when properly cleaned to a dead cream white ; is very refractory, and only requires a slight admixture of some other more tenacious clay to give it sufficient adherence to bear moulding. This is the Khari of the natives, and is the same as that which occurs near to the Ganges north of Colgong ; and which was so long since as 1840 very strongly recommended by Dr. O'Shaughnessy for the purposes I have mentioned. Within the district of the Rajmahal Hills, it occurs in several places ; near to Lohuria, in the ridge joining the hill of Gundesru, &c. &c. ; and again in abundance at Khari-puhar in the South, outside the Damin-i-koh boundary. This clay has been partially worked at Patturghatta, on the banks of the Ganges, for pottery ; wood being here used as the fuel in baking : elsewhere it is only dug for the ordinary uses to which it is applied by the natives, colouring houses, writing, painting, &c. In connexion with the coal of this district, it will hereafter prove a valuable material.

There are few other mineral products within the district of any value. Some of the highly indurated beds of shale which occur under the trap-rocks, would with proper selection, afford stones well adapted for the purposes of coarse hones, or sharpening stones (oil stones) ; and might be so applied ; of this kind is a bed near Burhait of a salmon-coloured tint (erroneously described as "clink-stone,") from which, with a little care in the selection, good pieces could be obtained.

Throughout the hills, the trap rocks themselves yield the most admirable road materials. Throughout the Damin-i-koh, excellent

roads traversing the district in all the principal directions have been constructed under Mr. Pontet's direction. In this respect, as in many others, the Government district offers a most striking and most favourable contrast to the adjoining zemindaris, in which it is almost impossible to move about excepting on Elephants, and which are marked, not so much by the badness of the roads, as by the total absence of any of these means of communication.*

From some of the sandstone beds, (as at Mussinia) mill-stones are extracted, but in the rudest and most expensive way, by cutting the stone out of the solid mass from the centre of the beds. The demand for these is small, and but few are extracted.

In addition to the district referred to above, the small area in which coal, and its associated rocks occur near to the villages of Khutunga and Tungsuli, on the northern bank of the river. More about five miles from Soory, (Beerbhoom) was carefully examined.

It is quite isolated, being surrounded on all sides by primary slates, gneiss, and granite rocks. From east to west the sandstones and shales extend about 2 miles in length, and from north to south about one mile, covering an area of about $2\frac{1}{2}$ square miles. There is no thickness of these rocks, and among them no coal of any value occurs. There are thin seams, and irregular layers, but of no commercial value. The rocks have a general but slight dip to the south by west (about 50), and fill a little hollow or basin in the primary rocks.

* It is, I think, to be regretted that more care and skill have not been devoted to the selection and laying out of these roads within the Damin-i-koh; and to rendering them more permanent. The Sontals are fully alive to the value of the facility of communication, and readily construct a road; but they naturally take it to, or through their own villages, or divert its course to avoid the slightest obstacle. Many of these roads are, in consequence of these deviations, nearly twice as long as they need have been from point to point. This may be of little consequence now, but every year is extending the cultivation of these hills; and every year is rendering it more desirable that these lines of communication should be improved. The same time and labour now devoted to the annual repair of a road the direction of which may be changed the next month, would suffice for the making and repair of a more permanent road in a fixed direction.

This little area is interesting only as proving the former extension of the formation to which these rocks belong, but is economically, of no value whatever.

No. 334.

Copy of this letter and of its enclosure forwarded to the Asiatic Society.

On the quantity of Silt held in suspension by the waters of the Hooghly at Calcutta, in each month of the year. By HENRY PIDDINGTON, Curator, Museum of Economic Geology.

I some years ago (1842) collected for examination a set of two bottles of the waters of the Hooghly taken on the 1st of each month, at noon, at Calcutta and at Burisaul, with the view of obtaining a fair average of the actual amount of silt held in suspension by the waters of the Hooghly and the Burrampooter near their mouths. The time of tide was purposely neglected, as either high or low water, or any intermediate term between these would have given a result perhaps farther from a fair average than taking it at all times.

One set of these bottles I sent to professor Ehrenberg for his researches on the Infusoriæ. His reply did not reach me, but Dr. Falconer informed me that he had received them and spoke highly of the curious results he had obtained. A press of other matter prevented me from following out the enquiry I then proposed to myself, and the bottles remained in the Museum.

In the course of some private researches connected with questions arising in my mind as a member of the Hooghly River Committee, I was again desirous of ascertaining the average amount of silt, and I fortunately found that 11 out of 12 of the Hooghly-water bottles were yet forthcoming, but only seven of those from Burisaul; but the loss of these last was not so much to be regretted, as Burisaul is not favourably situated for the collection of specimens of water from the great Ganges. The results here stated then relate to the Hooghly only, at Calcutta.

The annexed table represents in columns the results obtained in each month from a given number of fluid ounces of water ; column A being the contents of each bottle carefully measured, the mean of which is $25\frac{1}{3}$ fluid ounces ; column B represents the total amount of sediment of all kinds as found, varying from 29.25 gr. in June to 3.25 gr. in October !

Tabular statement of the amount of Silt in the water of the Hooghly at Calcutta for each month in the year 1842. The water being taken at Noon, on the first day of each month.

1842.	A Quantity of water.	B Total of sedi- ment.	C Earthy mat- ter.	D Carbonate of Lime.
	Oz.	Grs.	Grs.	Grs.
January,	$22\frac{3}{4}$	4.75	3.00	1.75
February, ...	$26\frac{1}{4}$	7.10	00.00	7.10
March,	28	24.00	6.25	17.75
April,	$26\frac{1}{4}$	27.75	11.15	16.60
May,	$23\frac{3}{4}$	18.10	6.45	11.65
June,	$24\frac{1}{2}$	29.25	21.00	8.25
July,	$25\frac{1}{4}$	11.00	6.40	4.60
August,	$27\frac{3}{4}$	13.65	5.50	8.15
September,...	$26\frac{1}{2}$	11.65	5.90	5.75
October,	$22\frac{1}{2}$	3.25	2.15	1.10
November,...	26	10.00	2.12	7.88
December,*	$24\frac{1}{2}$	7.37	2.56	4.81
Mean,	Oz. $25\frac{1}{3}$	Grs. 13.99	Grs. 6.04	Grs. 7.95

No doubt the state of tide has to do with these amounts, but the average of 13.99 gr. for the whole year is perhaps not very far from the truth ? Column C contains the weight of earthy matter

* December Intercalated between November and January.

only, when separated from the amount of Carbonate of Lime which, as will be seen below, it was both necessary, and of great interest to obtain. Column D shews the amount of Carbonate of Lime ; and herein a very curious fact, which is of much geological importance was disclosed, namely, that in some months so large a portion of Carbonate of Lime is held in solution by the waters of the Hooghly, that, as the Carbonic Acid evaporates, it is deposited in a crystalline crust at the neck and on the sides of the bottle, and in a few of these months it even forms a small cup-shaped stalactite on the apex of the bottom of the bottle ! adding thus very largely to the actual solid contents of the water when we come to consider them geologically.*

The table thus shews, as a mean result, that while the average of other earthy solid matters amounts only to 6.04 grains, the carbonate of lime amounts to 7.95 grains, or nearly one-third more in weight ; so that a rock formed of such silt would contain in round numbers 60 per cent. of carbonate of lime ! or be in other words a good *Kunkur* !

Reducing the fluid (apothecary's) ounces of water to cubic measure at 1.73296 inches to a cubic ounce, the average quantity of water 25.33 oz. will be equal to 43.89587 inches ; which, to save decimals, we may call 43.90 cubic inches of water, containing 13.99 grains of silt ; which for a cubic foot will give 550.677 grains or $1\frac{1}{8}$ th of an ounce by weight of solid silt !

I had also collected a small quantity of the silt deposited in the tanks in which the river water at Chandpaul Ghaut is pumped up for the aqueducts of the town, which contains, I find, 10.85 per cent. of calcareous matter, and taking this to be the average of the silt, I found that a cubic inch of it, moistened and beaten hard, and

* In a paper "*On the fertilizing principle of the inundations of the Hooghly*," published in vol. xviii. of the Society's Transactions twenty years ago (1833) I shewed, page 224, that lime, and not vegetable matter, was probably the fertilizing principle of the silt of the Hooghly, in which it was found to exist to the amount of 6 per cent. I also shewed that the drainings from the mud were highly impregnated with carbonic acid holding lime in solution. Sir Charles Lyall, *Elements of Geology* ; page 89, vol. I. of edition of 1841, says in reference to this, that it throws great light on the mineralization of organic bodies.

dried to the consistence of a sun-burnt brick (a *kacha* brick as it is called) weighed 424 grains, so that each cubic foot of water contains 1.2988 cubic inches of solid matter; or in other terms, each cubic foot of water holds $\frac{1}{1336}$ (one thirteen hundred and thirty-third) part of its bulk of silt in suspension on an average of the year, opposite to Calcutta.

In the months of March, April, May and June, in which the largest amount of deposit is shewn, the average it will be seen is much higher, being as follows.

	Cub. Ins.
Average quantity of water,	25.50 oz. or 44.190.
of silt,.....	24.77 grs.
of carbonate of lime,.....	13.56 grs.
of silt, in each cub. foot,	1678.92 grs.

being $\frac{1}{436}$ part (one four hundred and thirty-sixth) of its bulk, of which more than one half or $\frac{1}{2} \frac{3}{4} \frac{5}{7}$ is carbonate of lime!

This is far higher than the Rev. Mr. Everest's result for the four months of the rains at Benares, of $\frac{1}{855}$ in bulk,* but it is evident that no parallel can be established between the waters of the great Ganges at Benares and those of an offset of it like the Hooghly, flowing through a vast extent of alluvial soil; depositing and receiving on its progress the detritus of both new and ancient alluvial soils, and of primitive and transition rocks from the country on its western shores; but the whole result now obtained here is a highly curious one, and I think well worthy of being placed on record.

I find that water taken on the 24th January, from the middle of the river is turbid, but nothing more, and cannot hold much more solid matter in suspension, than is shewn by our table. Upon testing it by lime-water the large quantity of carbonic acid gas which it holds in solution (and which indeed is seen rising from it in bubbles when the bottle has been carried through the heat of the sun) is immediately apparent,† as is also the lime by Oxalate

* See Rev. Mr. Everest's paper; Journal As. Soc. vol. I. p. 238 quoted by Sir Charles Lyall also, in Principles of Geology, p. 269.

† The absence of sulphates being first ascertained by Muriate of Barytes and the carbonate redissolved by Muriatic acid.

of Ammonia ; both assays demonstrating clearly the perfect truth of the foregoing details.

POSTSCRIPT.

It was correctly remarked, I think by Major Baker, when this paper was read at the meeting of the Society, that water taken at the surface would hold less silt in suspension, as that at the bottom would hold more, than the true mean amount. Agreeing fully in this, I have contrived a plan for obtaining water at any moderate depth, and am collecting another series of specimens to include both the surface and the mean depth water. I have moreover obtained the assistance of Mr. H. Hiller, Commanding the H. C. Outer Floating Light Vessel, and have supplied him with directions so that I trust we shall be able to have this singular problem fully investigated in a year or two.

H. P.

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*Notices and Descriptions of various Reptiles, new or little known.—*

*By* EDWARD BLYTH.

(Continued from Vol. XXII. p. 655.)

CALAMARIA CATENATA, nobis, *n. s.* (*C. monticola*? Cantor, *P. Z. S.* 1839, p. 50).\* No anterior frontals: the vertical plate broad, pentagonal, and almost as large as the occipitals: 13 rows of scales: scutæ 187; scutellæ 41 pairs. Predominant colour dusky above, formed by minute black specks upon a pale ground-tint; below pale buff with an iridescent lustre, and marked with lateral series of square black spots chiefly upon alternate scutæ. Four black lines throughout above, the upper bordering a pale medial streak, which is simple upon the tail, but along the body forms a concatenation of elongated oval spots. An imperfect whitish-buff collar, and similar marks before and behind the eye. Length of specimen 17 in., of which tail  $2\frac{1}{2}$  in. From Asám. Mr. Robinson.†

C. RETICULATA, nobis, *n. s.* Vertical plate hexagonal, angulated to the front, and not half so large as the occipitals: supra-orbital

\* "*C. olivaceo fusca, collari, latè flavo, lineâ dorsali albicante, abdomine citrino. Scut. abd. 125; scutel. subcaud. 44. Hab. Naga Hills.*"

† This and other species sent by Mr. Robinson, we much suspect are from the Khásya hills, or other upland territory.



large and subtriangular. Thirteen rows of scales: scutæ 136, 138; scutellæ 27, 28 pairs. Colour shining dull black, brilliant and iridescent below: minute yellowish-white specks on the sides of the mouth, throat, and along the sides of the body. In spirit the edges of the scales are seen to be of a deep black, imparting a reticulated appearance. The larger of two specimens measures 12 in., of which tail  $2\frac{5}{8}$  in. From Asám. Mr. Robinson.

*C. TENUICEPS*, nobis, *n. s.* Colour iridescent black above, yellowish-white below. Nearly affined to *C. LONGICEPS*, Cantor, but the head anterior to the eyes much less elongated, and the posterior frontals consequently are about as broad as long: vertical plate elongate-hexangular, broadest anteriorly: head conical, narrow; the jaws of equal length. Thirteen rows of scales. Scutæ 138; scutellæ 37 pairs. Length of specimen 14 in., of which tail 2 in. From the vicinity of Darjiling. Capt. W. S. Sherwill.

The two following species of this genus are remarkable for having the posterior frontals united.

*C. FUSCA*, nobis, *n. s.* Of an iridescent dull black colour throughout, the ventrals slightly margined paler. Head small, narrow. Vertical plate pentangular with rounded anterior base, the posterior lateral angles so obtuse in some that the plate might then be described as triangular: occipitals very large, elongated. Thirteen rows of scales. Scutæ 155-7; scutellæ 30-34 pairs. Length 15 in., of which tail 2 in. Young obscurely striated with longitudinal rows of pale dots. From Darjiling. Capt. W. S. Sherwill.

*C. OBSCURO-STRATA*, nobis, *n. s.* Much affined to last: the muzzle less obtusely pointed, and the anterior frontals conspicuously smaller. Iridescent brown-black, the under-parts particularly lustrous; obscurely streaked throughout with a pale band occupying the adjoining portions of the fourth and fifth rows of scales on each side, a narrow pale line also along the middle of each of the first three rows, and three similar narrow pale lines along the back, all alternating with dusky lines. Thirteen rows of scales. Scutæ 153-163; scutellæ 40 pairs. Length of the larger of two specimens  $11\frac{1}{4}$  in., of which tail 2 in. From Rangoon.

The next has both the anterior and the posterior frontals, respectively, united or undivided.

*C. BICOLOR*, nobis, *n. s.* Dusky-plumbeous above, buffy-white below, throughout; these colours gradually blending, and not abruptly demarcated as in *C. TENUICEPS*. Vertical plate pentangular, broader than long, or forming almost a triangle laterally truncated: rostral large and broad; the muzzle consequently obtuse; and the head broader and flatter than usual in this genus. Seventeen rows of scales. Scutæ 210; scutellæ 75 pairs. Length of a specimen  $19\frac{1}{2}$  in., of which tail  $4\frac{3}{8}$  in. From Asám. Mr. Robinson.

*CORONELLA CALLICEPHALUS*, Gray, *Ann. M. N. H.*, Dec. 1853, p. 390.\* A beautiful species, with form and scutation of head as in the European *COLUBER ESCULAPEI* (as figured by Schlegel); but the eye somewhat smaller. Nineteen rows of scales: scutæ 201, 211; scutellæ 56, 65 pairs. Colour a light brown, paler below. Head with a median black line over the vertical and occipital scutæ, and another continued from each eye to the first of a series of about 18 semi-annuli, which in the young consist of large and broad white-edged black spots, reaching down to the abdominal scutæ; but in adults the black of the interior of these spots disappears more or less completely, leaving only the pale-margined black edge, so that two narrow black transverse bands remain in place of the single broad black spot of the young: also at about the ninth or tenth of the latter from the head, two narrow black dorsal lines commence, which at first are broken and irregular, but gradually become continuous and well defined towards and upon the tail, where they cross its transverse bands and are continued to the extreme tip. Length of a specimen 27 in., of which tail 4 in. From Asám. Mr. Robinson.

*XENODON PURPURASCENS*, Schlegel. The varieties of colouring of this Snake are extraordinary; even more so than those of *LYCODON AULICUS*. Two adults in spirit from Goalpara are entirely of a pale colour (evidently, however, much blanched), *without traces of markings*. Another, from Asám, is of a dull red-brown above, with narrow black transverse bands; lower-parts reddish-pearly, with two rows of somewhat indistinct black spots, mostly on alternate scutæ: head-markings indistinct. A third variety (*Coronella albocincta*, Cantor, *P. Z. S.* 1839, p. 50), also from Asám, is of a clay colour,

\* When the above description was taken, we had not seen that by Mr. Gray, which is less detailed.

the scales black-margined and sprinkled over with minute black spots, and the entire length marked with about 24 black-edged white semi-annuli; beneath, the black spots are more developed than in the last variety, and are more or less continuous towards the vent: the usual head-markings distinct. Two others, from Goalpara and Lower Asám, nearly resemble the last, but have no white semi-annuli, nor markings underneath the tail or anterior third of body. Others, again, from various parts, including central\* and S. India and Ceylon, also the Tenasserim provinces, have the upper-parts more or less dark, and variously freckled, often with imperfect semi-annuli placed near together, and alternately distinct and comparatively obscure: the under-parts commonly spotless; and sometimes the collar quite black. A single young specimen from Ceylon has 3 rows of black spots continued upon each scuta as far as the vent, where the medial row ceases, and the other two rows are continued to the tip of the tail: above, the black semi-annuli are divided, and the halves placed alternately to the right and left, becoming gradually indistinct upon the hinder half. Upon a first view, this might be considered a distinct species; but we can perceive no structural variation from the rest, and intermediate varieties most probably occur. In all, save the first, the peculiar markings of the head readily indicate the species; as do the rostral and anterior frontal plates from other Indian serpents.

*COLUBER NIGROMARGINATUS*, nobis, *n. s.* Nearly affined to *C. RADIATUS*, Schlegel, but attaining the size of *C. MUCOSUS*, (L., v. *Blumenbachii*, Merrem): our largest specimen measuring  $7\frac{3}{4}$  ft. long, of which the tail is 2 ft. 1 in. Colour a bright pea-green (changing in spirit to blue), paler below, each scale of the upper-parts margined with black. Upon the shields of the crown the black margins are extremely slight though present, and they gradually increase in breadth posteriorly until about the middle of the entire length, when the two colours resolve into four black alternating with three narrower blue streaks which are continued to the end of the tail. Eye larger than in *C. MUCOSUS*, much larger than in *C. RADIATUS*. One large superior and one small inferior præ-ocular plate; and a single frænal, the latter as in *C. RADIATUS*, to which

\* Ammerkántak, towards source of Nerbudda; 3700 ft. elevation.



the present species bears a near approximation in the details of its structure. Sixteen rows of scales, the four median slightly carinated. Scutæ 192-4; scutellæ 126-132 pairs. Hab. Vicinity of Darjiling, where procured by Capt. W. S. Sherwill, who sent with it examples of *C. RADIATUS*, *C. KORROS*, and *C. FASCIOLATUS*. Dr. Kelaart has also favoured us with *C. KORROS* from Ceylon; but the species does not appear to have been hitherto observed in the Indian peninsula.

*C. PRASINUS*, nobis, *n. s.* Wholly green, becoming verditer in spirit; glaucous below and bordering the mouth: 19 rows of slightly carinated scales: scutæ 205, 6; scutellæ 107, 8 pairs. Vertical shield triangular with rounded apex; rather larger than the supra-orbitals, and rather smaller than the occipitals: a single large præ-orbital, and one elongate-oval frænal. Tail suddenly tapering. The larger of two specimens measures 37 in., of which tail 9 in. From Asám. Mr. Robinson.

*C. HEXAGONOTUS* (?), Cantor,\* var., adult. Length 4 ft., of which tail  $15\frac{1}{2}$  in.; the latter remarkably slender. Colour brown, paler below; the anterior fourth of the body marked with transverse dusky bands, which become gradually more obscure till they disappear. Seventeen rows of slightly imbricated scales, the median row hexagonal. Vertical plate large, pentagonal, broad to the front. Two præ-orbitals, the lower small and bordered by the third and fourth labials; the fourth labial bordering the eye, which is of moderate size; two post-orbitals, and a third or infra-orbital bordering on the fourth, fifth, and sixth labials: nasals large, elongate, the nostril opening in the middle, near the outer border of the anterior frontal; a single small subtriangular frænal. Scutæ 195; scutellæ 144 pairs. Hab. Arakan (Ramri)?

*C. DIADEMA*, Schlegel; *C. Oppellii*, Wagler. This is a little known species; and two examples of it in our museum (origin uncertain) would not be readily recognised from Russell's plate (II, 30), which would appear to have been taken from an old and remarkably thick individual. One of the Society's specimens is of about equal length to that figured by Russell, but is much more slender; the other is smaller. The markings of the head are very peculiar, as the transverse black band from eye to eye and continued below the

\* *J. A. S.* XVI, 921.



eye, and the four black specks on the two occipital plates. Upon the nape is a longitudinal black stripe, followed by a series of black spots along the spine, the first few of them being round, the rest gradually assuming the appearance of short transverse bands, much more regular and placed nearer together than as represented by Russell: towards the tail they diminish in size, and upon it are reduced to a series of minute black specks. Their number, from head to base of tail, amounts to 75. Alternating with the dorsal bands is, on each side, a series of smaller lateral transverse bands, which begin on the sides of the neck as large round black spots, following two oblique streaks behind the eye, and disappear altogether on the tail. They are placed with great regularity; and on the borders of the abdominal scutæ is a further series of black spots. Such are the markings of our larger specimen, these being of an unmixed black. In our smaller example, all the dorsal black bands have the middle of each scale marked with the pale clay-colour which constitutes the general ground-tint, the lateral streaks are less decided, but the spots on the borders of the scutæ are more so, and every alternate scuta has an additional spot near each lateral margin. There are 19 rows of perfectly smooth (or not carinated) imbricated scales. Eye rather large: a great upper and small lower præ-orbital; one large subquadrate frænal; two post-orbitals: and the fifth and sixth labials border the eye below. Scutæ 207-8; scutellæ 98 pairs. Length of our larger specimen  $36\frac{1}{2}$  in., of which tail  $9\frac{1}{4}$  in.

*C. PICTUS*, Daudin; *C. Plinii*, Merrem (Russell, I, 29). Of this little known species, Mr. Jerdon has favoured us with a young example, from S. India. It is a true *COLUBER*, and not a variety of *CORONELLA BALIODEIRA*, Schlegel, as suspected by Dr. Cantor.\*

*HERPETODRYAS HELENA*, (Daudin). In the Society's museum are two specimens of a Snake, from Darjiling and Rungpore respectively, which may represent a variety of this species. Colour nearly uniform brown above, yellowish-white below with two lateral rows of dusky specks, one speck on each side of every abdominal scuta; a slight dusky streak from behind the eye; a trace of a black V-like mark on the nape; and very obscure indications of body-markings

\* *J. A. S.* XVI, 913.

analogous to those of Russell's figure (I, 32). Seventeen rows of carinated scales. The larger of two individuals measures  $29\frac{1}{2}$  in., of which the tail occupies 8 in., and head 1 in. Scutæ 189, 199; scutellæ 84, 90.

*PSAMMOPHIS CONDANARIUS*, Gray (Russell, I, pl. 27; very bad). Seventeen rows of smooth scales, of which the first row on each side is very broad, the second row less broad, and the rest narrow and lanceolate. General colour bright green above, pale yellow or yellowish white below; longitudinally striped, except more or less towards the head, with four pale bands: the upper occupying the fourth and half respectively of the third and fifth rows of scales, and bounded above and below with a more or less defined narrow black line; the lower occupying the lateral margins of the abdominal scutæ and subcaudal scutellæ, and defined above and below with narrow black lines which are very distinct. A pale superciliary streak bordered with black commences from the nostrils, and another below the eye, occupying the upper half of the labials. Some also shew an ill-defined pale dorsal streak. Hab. Lower Bengal?

*LEPTOPHIS RUBESCENS*; *Dipsas rubescens*, Gray, Hardwicke's *Ill. Ind. Zool.* This seems affined to *DENDROPHIS RHODOPLEURON*, Schlegel, from Amboyna. The nareal apertures are remarkably minute and abruptly pierced in the centre of the nasals. Vertical plate narrow. Neck slender. Body much compressed. General aspect of colour reddish-brown, powdered over throughout, excepting on the chin and throat, with minute specks. A row of black spots along the spine. A brown central occipital stripe, and similar lateral stripe from nostril to ear. Seventeen rows of smooth scales. Scutæ 198; scutellæ 120. From Mergui. Capt. Berdmore.

*L. ORNATUS*, (Shaw), var. Marked very like young specimens of *CORONELLA RUSSELLII*, excepting on the head. Colour olive-brown, the upper-parts marked throughout with a regular series of transverse black bars, broader towards the head, narrower and becoming indistinct towards the end of the tail; these black bars set off by whitish edges. Head marked nearly as usual. From Ceylon. Dr. Kelaart.

*DIPSAS FERRUGINEA*, Cantor, *P. Z. S.* 1839, p. 53. Head smooth and flat above, remarkably Frog-like, with somewhat pointed muzzle:

anterior frontals very small; the supra-orbitals larger than the vertical plate. Canines above and below well developed. Tail suddenly tapering. Colour a dull somewhat ferruginous brown above, a little marked with black and white shewing between the scales; a broad dark lateral band throughout, and above it an obscure pale band: lower-parts buffy yellowish-white, with a narrow dark lateral band on each side, and the rest thickly sprinkled over with minute black specks. Head with a narrow black median line over the frontal and vertical plates, and another over the supra-orbital, meeting its opposite on the occipital and continued to the nape: black lines also border the lips and pass through the eye. Seventeen rows of scales: scutæ 171, 175; scutellæ 56, 64 pairs. Length of one  $18\frac{3}{4}$  in., of which tail  $3\frac{1}{4}$  in. From Asám and the vicinity of Darjiling; Mr. Robinson and Capt. Sherwill.

D. MONTICOLA, Cantor, *P. Z. S.* 1839, p. 53. Affined to D. TRIGONOTA in structure. Brown above, pearly-white below, separated by a broad black streak behind the eye: lowermost row of scales black-bordered for the anterior third of the body; and traces of other lines towards the head. Fifteen rows of scales: scutæ 158, 193; scutellæ 82, 106 pairs. Length of one 22 in., of which tail  $7\frac{1}{4}$  in. Hab. Asám; Mr. Robinson.

D. NIGROMARGINATA, nobis, *n. s.* Also affined to D. TRIGONOTA, with median row of dorsal scales broad and hexagonal. No elongated teeth. Colour throughout green above, the distensible skin black between the scales; yellowish-white below. Twenty-one ranges of scales: scutæ 252; scutellæ 132 pairs. Length of one 42 in., of which tail 11 in. Hab. Asám. Mr. Robinson.\*

\* D. TRIGONOTA, the most common species of India proper, attains to about 6 ft. in length, but is rarely met with so large, and preys (at least those of medium size) chiefly on the CALOTES VERSICOLOR in L. Bengal. Vertical shield as broad as in the Malayan D. MULTIMACULATA, not less so as represented in Dr. Schlegel's plate. The markings are ill represented by Russell, who figures the young. The very young (about 9 in.) are of a pale ashy colour, with but slight traces of the markings of the adult; a faint lateral band consisting of three parallel somewhat darker lines is continued throughout the length, also a medial and two lateral abdominal lines, besides which the under-parts are very minutely speckled. There is a white median frontal streak bordered with black, continued into a black occi-



*TROPIDONOTUS ZEBRINUS*, nobis, *n. s.* (TR. CHRYSARGOS, Schlegel, var.?) Vertical plate twice as broad as the superciliary, and of same length. One præ-orbital and three post-orbitals. Upper-parts (in spirit) deep plumbeous, obscurely spotted with black; the sides and under-parts yellowish-white, the former throughout banded with black, and each band having a whitish spot (probably yellow in the recent specimen) above it. Head plumbeous above, the labial plates with a triangular black spot at the point of junction of each of them above, and exhibiting thus two larger spots posterior and two smaller anterior to the eye. Two or three distinct black bands across the nape. Rows of scales 15: scutæ 137; scutellæ 96 pairs. Length of specimen (which is quite young)  $10\frac{3}{8}$  in., of which the tail measures  $8\frac{1}{2}$  in. From Mergui. Capt. Berdmore.

TR. ANGUSTICEPS, nobis, *n. s.* Head narrow, not broader than the neck, little depressed, the eye much larger than in TR. UMBRATUS, and vertical shield broad. Colour (in spirit) plumbeous above, uniformly spotted with black throughout; below whitish, more or less variegated with black on the hinder half: head without markings; but a V-like mark on the nape with apex towards the occiput, becoming obsolete in adults. One specimen has 4 præ-orbital and 5 post-orbital plates; but in general these number 2 or 3 and 4: and the same specimen is remarkable for having no dark markings above, but some indistinct pale spots, probably of a vivid colour on the recent Snake. In an adult the black spots on the upper parts are almost confined to the skin between the scales, and there is no blackish colour on the hinder half underneath. Seventeen rows of scales: scutæ 167, 72; scutellæ 57, 67 pairs. Length

pital streak. When 2 or 3 ft. long, the white frontal streak is retained, and at the occiput are two diverging white lines, which converge and meet behind at the first of the series of imperfectly triangular white spots bordered and set off with black, which are continued throughout the body; becoming gradually more ill defined towards and upon the tail. The lower-parts are now pearly-white, a trace only of the lateral abdominal lines appearing as a row of small spots on each side, though not regularly upon every scuta. The full grown adult is altogether much darker, with the white markings tending to become obsolete; a conspicuous median black stripe is continued over the forehead and occiput, and another proceeds backward from each eye. Abdomen more or less speckled, with the lines of lateral spots more or less apparent.



of an adult 41 in., of which tail  $8\frac{1}{2}$  in. Inhabits Asám and Arakan.

TR. SUBMINIATUS (?), Schlegel. A most variable species, affined in structure to the preceding. One 16 in. long has the upper-parts speckled over with black and bright yellow on a greenish ground, under-parts whitish throughout. Head plumbeous above: a large black patch behind the occiput, surrounded except in front by orange-yellow border, behind which again the nape is bright vermillion, chiefly between the scales. A conspicuous black streak below the eye, and two black spots posteriorly towards the gape: scutæ 147; scutellæ 94 pairs. Another, rather larger, has the back almost plain dark plumbeous, paler and spotted with black towards the nape; lower-parts freckled with minute black specks, and increasingly so to the tail-tip: occiput and nape green, crossed with two orange bands, becoming redder posteriorly. All the upper labials with a black stripe, where each adjoins the next. Scutæ 157; scutellæ 66 pairs. A third, 29 in. long, has the upper-parts dark olive brown, with bright yellow spots on the skin between the scales; the lower dull pearly: nape green, followed by a vermillion space: a single broad black streak below the eye. Scutæ 155; scutellæ 83 pairs. The above three specimens are from Asám. Numerous others from Rungpore and Arakan, are mostly similar to the last, with generally a double black streak below the eye uniting beneath, rarely a single streak, and one large specimen has no streak below the eye: this would seem to disappear with age. Rows of scales 17, 19: scutæ 150, 166; scutellæ 60 to 90 pairs, but generally intermediate. Tail in all suddenly tapering. Largest specimen, which is much thicker than the others (denoting maturity), 3 ft., of which tail  $8\frac{1}{2}$  in.

TR. MACROPS, nobis, *n. s.* Eye very large; the vertical shield broad, and posterior frontals twice as large as the anterior. Prevailing hue of the upper-parts a dull vinaceous, many of the scales margined with black, and some with yellow: a series of yellow spots (about 50 in number) continued along the spine to the extremity of the tail, with a row of black spots on either side. Head and neck plumbeous, diverging on the nape where the first of the series of yellow spots is placed; a slight whitish V-like mark on occiput.

Lower parts yellowish-white, with specks and powdering of dusky ; more prevalent towards and upon the tail. Seventeen ranges of scales : scutæ 164-6 ; scutellæ 130-46 pairs. Length of largest specimen 31 in., of which tail  $6\frac{1}{4}$  in.

Two specimens closely resemble, but a third presents some differences of colour. The row of yellow spots is wanting along the spine, also the dark band on the nape, and the pale V-like occipital mark : the under-parts also are more uniformly whitish. Scutæ 168 ; scutellæ 124 pairs only. All are from near Darjiling. Capt. W. S. Sherwill.

*TR. DIPSAS*, nobis, *n. s.* Form as in *DIPSAS*, slender, the neck much compressed. Head oval, flattened above ; eyes large ; the muzzle anterior to the orbits short : nostrils small, opening quite laterally ; the nasal and rostral shields being vertical. General colour plumbeous above, obscurely spotted with black, and two barely traceable lines of whitish spots, more distinct towards and upon the neck where they increase in size towards the head. Occiput black, with an elongated white medial spot, and white V-like mark behind it, the apex of which is prolonged a little backward. A narrow black line from eye to eye passing in front towards the muzzle ; and broader black streak posterior to the eye, continued as a series of longish oval spots on the sides of the neck bordering the scutæ. Some black marks also on the upper labials. Under-parts white throughout, with a row of minute black specks on either side. Rows of scales 17 : scutæ 169 ; scutellæ 90 pairs. Specimen (young)  $21\frac{1}{2}$  in. long, of which tail  $4\frac{1}{4}$  in. Vicinity of Darjiling. Capt. W. S. Sherwill.

*TR. PLATYCEPS*, nobis, *n. s.* A beautiful species, with small and flat (but not broad) head, having much the aspect of a *HERPETO-DRYAS*.\* Young specimens generally shew the two white dots on the occipital shields, seen also in *TR. UMBRATUS*. Frontal and nasal shields vertical. Head and upper-parts deep green with slightly black-edged scales ; the lower-parts bright yellow, with a coral-red stripe bordering the abdominal scutæ on each side, and strongly

\* Perhaps *H. FRÆNATUS*, Gray, (*Ann. M. N. H.*, Dec. 1853, p. 390,) may prove to be a variety.

tinging the sides of the body : subcaudal scutellæ variegated with greenish-dusky, and traces of the same about the throat. A white streak bordered with black passes backward from behind the eye and then upward to the occiput, but this would seem to disappear with age. Such is (or was) the colouring of two specimens respectively 27 in. long (of which tail 8 in.), and  $21\frac{1}{2}$  in. (of which tail  $6\frac{1}{8}$  in.). But another,  $21\frac{1}{2}$  in. long, is remarkable for having the chin and throat quite black, also the black markings of the dorsal scales more strongly developed than in the others, and the black marblings of the subcaudal scutellæ are more intense : the lateral coral-red band is merely indicated ; and the white streak behind the eye is more strongly developed and continued forward to the muzzle. Number of rows of scales 19 : scutæ 174, 86 ; scutellæ 89, 99 pairs. Another, from Asám, appears identical, but has 155 scutæ only ; and in spirit appears of a dull olive-green colour, with two longitudinal pale ruddy dorsal stripes, much as in *TR. STOLATUS*, and the lower-parts are marked throughout with a black lateral spot on each scuta, seen also in the black-throated specimen. A small young example from the Khásya hills is similar to that from Asám. The three first described are from near Darjiling. Capt. W. S. Sherwill.

*ELAPS PERSONATUS*, nobis, *n. s.* Vertical plate about equal to the posterior frontals : supra-orbitals large, subquadrangular, elongate. Colour of upper-parts bright red in the adult, brown or reddish-brown in the young ; marked throughout with from 22 to 28 narrow black semi-annuli, having slight whitish margins : under-parts dull yellowish-white, mottled throughout with black patches more or less developed : head black above, with whitish muzzle and broad cross band posterior to the eyes. Scales lustrous ; 13 rows above : scutæ 196, 218 ; scutellæ 29, 34 pairs. Length of largest specimen  $24\frac{1}{4}$  in., of which tail  $2\frac{3}{4}$  in. From Asám.

*RANA ROBUSTA*, nobis, *n. s.* A moderately large Frog from Ceylon. Limbs exceedingly thick and massive ; the third-digits fully webbed. Skin subgranulose, especially on the lower-parts. A slight transverse fold on the breast. Colour dusky above, with a large black patch on the back, another on the croup, and smaller lateral patches. Lower-parts yellowish-white, with a V-like mark



on the lower surface of the thigh in one of two specimens, both males. The same individual has dusky spots or imperfect streaks on the lower surface of the thigh, and its posterior surface is marked with longitudinal streaks of alternating black and yellowish-white. Digital membrane speckled with black. Length from snout to vent 3 in., and of hind-limb 4 in., of which the foot is half. Presented by Dr. E. F. Kelaart.

*LYMNODYTES MACULARIUS*, nobis, *n. s.* Differs from *L. ERYTHREUS* by the slightly but distinctly papillose skin of the back, and non-verrucose posterior surface of thighs; by its shorter and stouter limbs, and short anterior digits, the two outermost of which have their terminal disks smaller than in *L. ERYTHREUS*. There is a broad black band from nostril to loin, bordered above and below by narrow pale yellow streaks. Entire lower-parts spotless light yellow, as also the upper lip. A black spot at the shoulder, and line along the posterior surface of the fore-limb. One or more similar lines on the hind-limbs; the thighs beautifully mottled with black; and a black medial line along the back, which becomes double over the loins. Length of male from muzzle to vent  $2\frac{3}{8}$  in.; of hind-limb  $3\frac{3}{4}$  in.; of which the foot measures  $1\frac{3}{4}$  in. Hab. Ceylon. Dr. E. F. Kelaart.

*L. LIVIDUS*, nobis, *n. s.* A large species with short and remarkably fleshy thighs. Colour dusky above, paler and tinged with ruddy on the sides which are spotted with black. Chin, throat and breast, minutely variegated pale and dusky. Belly and thighs underneath, sullied whitish. Above, the thighs and shanks are paler than the back and tinged with ruddy, having several dusky cross-bands. Posterior surface of thigh smooth or non-verrucose. Length from muzzle to vent  $3\frac{1}{4}$  in., and of hind-leg  $4\frac{1}{2}$  in., of which the foot is  $2\frac{1}{4}$  in. From Colombo. Dr. E. F. Kelaart.

*MEGALOPHYRS GIGAS*, nobis, *n. s.* (Edible Frog of Sikim, vide *J. A. S.* XXII, 557.) Adult male  $4\frac{1}{2}$  in. from snout to vent; hind-foot  $7\frac{1}{4}$  in., of which foot from heel  $3\frac{3}{8}$  in. Breadth of head 2 in. Interdigital membrane of the hind-foot well developed. Fore-limbs extremely thick, with the skin of their inner surface highly granulose. Upper-parts uniformly dull reddish or purplish black, a little marked with white on the posterior surface



of the thigh: below whitish, much suffused with dusky, and some irregular white spots or marblings along the rami of the lower jaw, and also on the sides of the body and along the sides of the limbs. What appear to be the young have the head proportionally less broad than in the adult, and the upper-parts have more of an olive tinge, and the under-parts are ochreous-yellow, mottled with reddish-brown. Hab. Sikim Himalaya. Capt. W. S. Sherwill.\*

BOMBINATOR SIKIMMENSIS, nobis, *n. s.* Size and general character of the European *B. IGNEUS*, (Laur.), but the hind-toes free or slightly webbed only at their extreme base. Male with four large subquadrilateral papillose callosities on the breast, and corresponding callosities on the upper surface of the innermost digits of each fore-foot. The tubercles of the head, body, and limbs, much more developed in males than in females. On the back are four irregular rows of large porous tubercles, and numerous minute tubercles without pores stud the rest of the upper-parts. On the hind-limbs small porous tubercles are very regularly disposed. Colour dull livid olive-green above, a little banded on the limbs; flame-coloured below, more or less marbled with dusky. Presented by Capt. W. S. Sherwill.

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In a collection of snakes from North Carolina presented to the Society by the Rev. F. Fitzgerald, through the American Consul, are two fine species of *HOMOLOPSIS*, which do not appear to be described either by Dr. Schlegel, or among the "extra-limitals" of New York by M. Dekay, or in other American lists to which we have access. They may, therefore, be here briefly characterized as probably new and undescribed.

*HOMOLOPSIS CRASSA*, nobis. Form thick and massive, with sub-tetragonal section; the head broad, subtrigonal, flat, much broader than the neck: body covered with 19 rows of broad, smooth and shining imbricated scales, which on the sides are much larger and broader than upon the back; eyes placed very forward: a single anterior frontal, and series of 7 upper and 9 lower labials. Teeth very minute. Colour black above, yellowish-white below; the sides

\* Two other forms affined to *MEGALOPHRYS*, and like it and *BOMBINATOR*, exhibiting no external *tympaña*, also sent from the Sikim Himalaya by Capt. Sherwill, we have at present no means of classifying, for want of books of reference.

transversely banded with about 75 bands in all, the black of the back descending and the yellowish-white of the lower parts ascending alternately, and the former continued irregularly across the lower-parts where the two colours are about equally distributed. Head black, irregularly variegated with yellowish-white; the rostral and labials of the latter hue, and all except the last three inferior labials having a medial black spot. Most of the shields of the chin and throat are also thus spotted. Scutæ 200; scutellæ 37 pairs. Length of specimen 4 ft., of which tail 4 in. Head  $1\frac{3}{8}$  in. in greatest breadth.

*H. PARVICEPS*, nobis. Form moderately thick, attenuating towards the head, which is small and not broader than the neck; body covered with 19 rows of smooth shining imbricated scales, which on the sides are much broader than upon the back; tail with only 8 rows of hexagonal scales besides the scutellæ. Two anterior frontals, half the size of the posterior. Teeth minute. Colour black above, yellowish-white beneath, the latter extending over  $2\frac{1}{2}$  rows of scales on either side. Three yellowish-white dorsal stripes, one median extending from the occiput to the middle of the tail, the others lateral and occupying part of the 5th and 6th rows of scales. On the lower parts, also, two lines are formed of broad black spots, one on either side of each scuta, and along the middle of the body is a third and median row. The shields of the head are margined and variegated with yellowish-white, and each labial except the posterior three lower are whitish having a large black spot. Scutæ 161; scutellæ 45. Length of specimen  $2\frac{1}{2}$  ft., of which tail  $5\frac{1}{2}$  in.

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ADDENDA. Since the former part of the foregoing paper was published, the author has had an opportunity of shewing the Society's specimens of Burmese Tortoises to the Rev. J. Mason of Maulmein, who has long devoted considerable attention to the zoology of the Tenasserim provinces. This gentleman immediately recognised the *TESTUDO MEGALOPUS* (*J. A. S.* XXII, 640,) as the species with which he was most familiar in Burma: at once distinguishing it from the Indian *T. STELLATA*: and as his judgment is worthy of confidence, we may pretty safely now rank *T. MEGALOPUS* as a third Burmese species of the genus.

At about the same date of publication, appeared a paper by Dr. Gray on some undescribed species of reptiles collected by Dr. Joseph Hooker in the Khásia mountains and Sikim Himalaya. Among them, his genus *DOPASIA* approximates my *OPHISEPS* (*J. A. S.* XXII, 655), but is evidently distinct; the position of the vent in *DOPASIA* is not stated. *PARIAS MACULATA*, Gray, is identical with *TRIGONOCEPHALUS NILGIRIENSIS*, Jerdon, *J. A. S.* XXII, 524, as we find upon comparison of a fine Asámese specimen with the descriptions by Messrs. Jerdon and Gray, and with a coloured figure sent by Mr. Jerdon. Mr. Gray does not give the number of rows of scales or of abdominal or caudal plates. Mr. Jerdon writes—"23 rows of carinated scales. Scutæ 142; scutellæ 36." The Asámese specimen has 23 rows of the first; scutæ 143; scutellæ about 36 pairs. Length  $14\frac{1}{2}$  in., of which tail barely 2 in. Colour pale, variegated with dark blackish-edged patches on the upper parts, forming irregular transverse bands, more or less divided and the halves alternating; below whitish, the plates speckled laterally with dusky; chin and sides of throat blackish; a whitish band proceeding backward from the eye, another from cleft of mouth, and between them a black space. This Asámese specimen has an elongated black occipital spot, succeeded by two lateral streaks which unite posteriorly; a somewhat different arrangement from that in Mr. Jerdon's drawing, and again different from that exhibited in an example from the vicinity of Darjiling, which also has the under-parts much more mottled with black; but all are evidently identical in species.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR APRIL, 1854.

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At the usual monthly meeting of the Society held on the 6th instant,

Sir J. W. Colville, Knight, President, in the chair.

The minutes of the last month's proceedings were read and confirmed.

Presentations were received—

1. From Lady Elliot, a teak wood cabinet for coins, and copy of a Volume entitled 'Appendix to the Arabs in Sindh' printed for private circulation by the late Sir H. Elliot.

2. From J. Cockburn, Esq. Superintendent Barrackpore Park, Carcass of a Samber Deer. *Elaphus*.

3. From the Society of Natural Sciences of Cherbourg, through the Foreign Office, the Memoirs of the Society, Vol. I. part 2.

4. From Mons. Bleeker, President, and Mons. G. A. Dehauge, Secretary of the Society of Sciences of Netherlands India, Vol. I. N. S. of the Transactions of the Society.

5. From Mr. Grote, on the part of Mr. Robinson, a Collection of Snakes from Assam.

6. 3 Indo-Sythic (*Kadphises*) gold coins found near the Black Pagoda, in the Pooree District, and sent for inspection by the Hon'ble E. Drummond, were laid on the table.

The following gentlemen were named for ballot at the next meeting.

J. J. Clarke, Esq. Civil Assistant Surgeon Hameerpore,—proposed by Mr. Freeling and seconded by Mr. Grote.

F. Schiller, Esq. Merchant, Calcutta,—proposed by Dr. Sprenger and seconded by Mr. Grote.

J. H. Campbell, Esq. Merchant, Calcutta,—proposed by Dr. Sprenger and seconded by the President.

The chairman on behalf of the Council communicated to the meet-



ing the intelligence of Dr. J. B. Mill's death, and proposed the following resolution which was carried unanimously. *Resolved*, that the Society receive with much regret the intelligence of the death of the Rev. Dr. Mill, who was formerly, for many years, one of its Vice-Presidents, and, in point of Oriental learning, one of its most distinguished ornaments.

Read Letters—

1. From Bábu Rádánáth Sikdár, communicating Abstracts of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1854.

2. From W. Muir, Esq. enclosing copy of the Meteorological Register kept at the Office of the Secretary to the Government of the North Western Provinces, Agra, for the month of January, 1854.

3. From Mons. A Schrötter, Secretary General of the Imperial Academy of Vienna, acknowledging receipt of the Journal and Researches, and requesting to be furnished with other volumes of those works.

4. Mr. E. C. Bayley exhibited to the meeting an interesting collection of ancient coins, which he had brought with him from Kungra.

5. The Librarian and the Curator of the Zoological Department submitted their usual monthly reports. The latter pointed out that Mr. Robinson's collection of snakes contained several species new to the Society's Museum, and some which had not yet been described.\*

LIBRARY.

The following books have been added to the library since the last meeting.

*Presented.*

Memoires de la Société des Sciences Naturelles de Cherbourg, 1 er vol. 2 me Livraison.—BY THE SOCIETY.

Advantages of Gas in Private Houses in Calcutta, with a Description of the Manufacture of Coal-gas.—BY CAPT. JAMES.

The Indian Annals of Medical Science or Half-yearly Journal of Practical Medicine and Surgery, No. 1.—BY THE EDITOR.

East India Company's Records founded on Official Documents, shewing a view of the Past and Present State of the British Possessions in India.—BY Cesar Moreau. Lithograph.—BY THE AUTHOR.

Natuurkundig Tijdschrift voor Nederlandsch Indie, Deel. IV. and afle-

\* Vide p. 287 *et seqs*, ante.

verings 1 to 4, of Deel V.—BY THE SOCIETY OF NATURAL SCIENCES OF NETHERLAND'S INDIA.

Report of the Calcutta Public Library for 1853.—BY THE CURATORS OF THE LIBRARY.

Selections from the Public Correspondence of the Punjab Administration, No. VI. 4 copies.—BY THE CHIEF COMMISSIONER OF THE PUNJAB.

Report on the Administration of the Salt Department of the Revenue of Bengal, for the year 1852-53.—BY THE GOVERNMENT OF BENGAL.

The Upadeshak, for March and April, 1854.—BY THE EDITOR.

The Calcutta Christian Observer, for March and April, 1854.—BY THE EDITORS.

The Oriental Baptist, Nos. 87, 88.—BY THE EDITOR.

The Oriental Christian Spectator, for February, 1854.—BY THE EDITOR.

The Citizen, from January to March, 1854.—BY THE EDITOR.

The Bibidhārtha Saṅgraha, No. 25.—BY THE EDITOR.

*Purchased.*

The Report of the British Association, for 1846.

Comptes Rendus, Nos. 23 to 26, for December, 1853.

Journal des Savants, for December, 1853.

The Annals and Magazine of Natural History, for January, 1854.

*Exchanged.*

Jameson's Journal, No. III.

The London, Edinburgh and Dublin Philosophical Magazine, No. 42.

RA'JENDRALA'L MITTRA.

*April 5th, 1854.*

FOR MAY, 1854.

The usual monthly meeting of the Society was held on the 2nd Instant at half-past 8 P. M.

Sir James Colville, Kt., President, in the chair.

The minutes of the last month's proceedings were read and confirmed, and the accounts and vouchers for the months of January and February submitted to the meeting.

A copy of Dr. Sprenger's Catalogue of the Oudh Libraries, Vol. 1, received from the Government of Bengal, was laid on the table.

Sháh Kabirudín laid on the table, a beautifully executed specimen of Persian Caligraphy by a Mauluvi of the Sasseram Madrasah.

The following gentlemen duly proposed and seconded at the last meeting were balloted for, and elected ordinary members.

Dr. J. J. Clarke, Hameerpore.

F. Schiller, Esq. Calcutta.

H. P. A. B. Riddell, Esq. B. C. S. was named for ballot at the next meeting, proposed by the Hon'ble Col. Low and seconded by the President.

Recorded a note from Major J. S. Banks, wishing to withdraw from the Society.

The Council submitted the following recommendations—

1st. That the offer of Rev. F. Mason, to print the text and translation of a Páli Grammar be accepted. The work to be published as proposed by the Secretaries, viz. an Introduction with a translation of the Grammar; in London, and the Páli text hereafter.

2d. That the estimated expense for completing the Society's collection of the Puráṇas, be sanctioned and charged to the Oriental Fund.

3d. That the present Editors of the *Iṣabah* be requested to commence with the publication of the latter portion of the work, to be brought out by Hajee Mohammed Hosain under the precautions necessary to preserve uniformity in the series, and that his offer to become the Society's Agent be also accepted.

4. That the Society subscribe for 5 copies of Pandit Premchand's edition of the *Rághava Pándaviya*, the cost being charged to the Oriental Fund.

Resolved that the recommendations of the Council be adopted.

Read Letters—

1. From Bábu Rádhánáth Sikdár enclosing Abstracts of Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of February, 1854.

From W. Muir, Esq. Secretary to the Government of the North Western Provinces, enclosing Meteorological Register kept at the Secretariat Office, Agra, for the month of March last.

From R. Clarke, Esq. Honorary Secretary to the Royal Asiatic Society of London, acknowledging the receipt of the last 4 Nos. of the *Bibliotheca Indica*.

The Curator of the Zoological Department and the Librarian having submitted their usual reports, the meeting adjourned.

#### LIBRARY.

The following additions have been made to the Library since the last meeting.

#### *Presented.*

Das Arabische Hohe lied der Liebe, das ist Ibnol Fâridhs Taijet in Text und Übersetzung. Zum ersten male zur ersten säcular-feier der K. K. Orientalischen Akademie. Herausgegeben von Hammar Purgstall. Wien 1854, royal 8vo.—BY THE AUTHOR.

Hony Hâe kin Chin or the Law of Storms in Chinese, by D. J. McGowan, M. D. Ningpo, 1853.—BY THE AUTHOR.

Algemeen Verslag der Werkzaamheden van de Natuurskundige Vereeniging in Nederlandsch Indie. Door Dr. P. Bleeker, Batavia, 1854, 8vo. Pamphlet.—BY THE AUTHOR.

Natuur-kundige Tijdschrift voor Nederlandsche Indie, Deel V. aflevering Ven VI.—BY THE EDITOR.

Nieuwe Tien tallen Diagnostische Beschrijvingen van Nieuwe of Weinig bekende Viscosorten van Sumatra, Door Dr. P. Bleeker.—BY THE AUTHOR.

Bij-drage tot de kennis der Ichtheologische Fauna van Halmaheira, Door Dr. Bleeker. Pamphlet.—BY THE AUTHOR.

Discours de M. Garcin de Tassy, a l'Ouverture de son cours d'Hindoustani, a l'Ecole Impériale et spéciale des langues Orientales Vivantes, pres la Bibliotheque Impériale, le 29 November 1853.—BY THE AUTHOR.

Notices of the Meetings of the members of the Royal Institution of Great Britain, Part III.—BY THE INSTITUTION.

Annual Report of the Royal Institution of Great Britain for the year 1852.—BY THE SAME.

Proceedings of the Royal Irish Academy Vol. V.—BY THE ACADEMY.

Astronomical Observations made at the Observatory of Cambridge by the Rev. James Challis, Vol. XVII.—BY THE SYNDICATE OF THE CAMBRIDGE OBSERVATORY.

The Quarterly Journal of the Geological Society. Vol. X. Part I.—BY THE SOCIETY.

First Report of the Centralising Christian School Book Society for the period from April to Dec. 1853.—BY BA'BU R. MITTRA.

The Indian Annals of Medical Science, a half yearly Journal of Practical Medicine and Surgery, No. II.—BY THE EDITOR.

Upadeshak, No. 89.—BY THE EDITOR.



The Missionary, Vol. IV. Part 1.—BY THE EDITOR.

The Oriental Baptist, No. 89.—BY THE EDITOR.

The Calcutta Christian Observer, for May 1854.—BY THE EDITORS.

The Oriental Spectator, for April 1854.—BY THE EDITOR.

Doorbeen, a Persian Newspaper, Nos. 1 to 4.—BY THE EDITOR.

The Tattwabodhiní Patriká, No. 129.—BY THE TATWABODHINI' SABHA'.

Bibidhártha Saṅgraha, No. 25.—BY THE EDITOR.

The Citizen (Newspaper).—BY THE EDITOR.

*Purchased.*

Stevenson's Murhatti Grammar.

The Annals and Magazine of Natural History, for February, 1854.

*Exchanged.*

The Calcutta Review, No. XLIII.

The London, Edinburgh, and Dublin Philosophical Magazine, No. 43.

RA'JENDRALA'L MITTRA.

*May 2nd, 1854.*



A SKETCH MAP

# SOHAYT, BOONAIR, CHUMLA.

TO AID THE SEARCH FOR

## NUSA, MEROS, AND AORNOS.

*Constructed chiefly from the lips of Travellers*

AND  
Natives assisted by Sanscrit Records

(Signed) J. Abbott

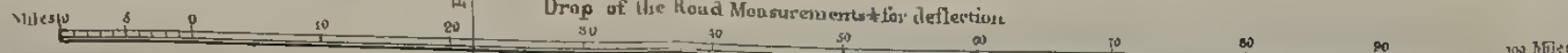


Peshawur Fort 34° 0' 44" N. Lat

NOTE The Base upon which this Map is constructed is taken from other Maps & believed to be somewhat erroneous in that the distance between Lohmang & Lark is in excess - The \* denotes a ruined site -

Peshawur Fort 71° 36' 44" E Long

Scale 15 Br. Miles = 1 Inch  
Drop of the Road Measurements for deflection





# JOURNAL

OF THE

# ASIATIC SOCIETY.

No. IV.—1854.

*Gradus ad Aornon.*—By Major J. ABBOTT.

Of all the sites mentioned by the historians of Alexander, none has excited deeper interest, none has so entirely defied research, as the celebrated Rock Aornos;\* that Rock which having thrice resisted the assaults of Hercules, yielded to the superior skill and indomitable courage of the son of Philip. Yet there is no site which seems so well defined by local peculiarities, none which at the outset a traveller would so confidently calculate upon identifying.

The author† of the best English history of Alexander thus confidently disposes of the question: “It is on the right bank of the Indus, close to the river. A traveller going up the right bank could not fail to find it.”

Acting upon this suggestion or guided by more direct reference to ancient authors, Edward Conolly, in A. D. 1839, ascended the right bank of the Indus as high as Umb, at that time in possession of the celebrated Poynda Khan, whose possessions Cis-Indus had been wrested from him by the Sikhs. He, being brother-in-law to Sir W. McNaghten our Cabul Envoy, had with him a Tosha Khana, and the distribution of handsome presents made him a welcome guest upon that border.

It is curious at this day to hear those who received him, relate the impressions left by the first Englishman that had ever been seen in that country.

\* We have, I believe, no means of ascertaining whether this name was Aornos or Aornon.

† The Rev. Mr. Williams.



Edward Conolly (brother of the traveller and martyr Arthur Conolly, whose name must ever be mentioned with reverence) was an enthusiastic antiquary. He possessed an excellent and choice library and had means of access to the Greek and Latin historians without aid of translations. His industry and enthusiasm, however, seem to have availed him little in the quest of Aornos. He may have made guesses, but it is certain that he did not see the Rock Aornos which "is so easily found by any traveller who proceeds up the right bank of the Indus." He may probably have been struck with the name Umb\* as the first syllable of that Umb Balimah where Alexander fixed his camp for the attack of Aornos. But it is improbable that Balimah, which is invisible from Umb, should have been discovered by him.

Another English traveller Capt. Leach† followed Edward Conolly's steps a year or two after him. He was probably more general in his enquiries. He met with the same attention as Conolly: but, if either had purposed proceeding higher up the Indus, he found on enquiry that such a step would be madness.

Vigne had come to Torbaila and had been struck with the name of Umb, but failed to discover its adjunct Balimah. Being a liberal-minded man, he allows his reader the choice of many sites scattered over the Eusufzye, the Wuzzeeree country, and the Punjaub even to Iskardoh beyond Cashmere. If in so ample an area, filled with rugged rocks and impregnable fortresses, no Aornos worthy of Hercules and Alexander is to be found, we hold the case to be indeed hopeless.

Now, it is very certain, that if Curtius's history be a faithful narrative of Alexander's movements, Mr. Williams' directions for finding Aornos are infallible. For since the assailants were hurled from the rock into the Indus, the rock must have beetled over the right bank of the river. Yet, not only Conolly, Leach and Vigne have failed to discover any such rock answering to the description

\* The name Umb seems to have struck several travellers. Genl. Court is, I believe, the first who observes upon it: Vigne the second.

† I write this name with some hesitation from memory, having forgotten to make a memorandum of it when the certificates given by this traveller to Poynda Khan were brought to me.

of either of the historians, but other officers have for years scrutinized the rocks on the right bank of the Indus with like disappointment. It may be well therefore to enquire wherein the difficulty lies.

Of all the histories written by ancient authors of Alexander's conquests only two\* remain. The "Anabasis" of Arrian and the "Exploits of Alexander" by Curtius, the first written 460 years, the second 400 years after the death of Alexander. The contemporary history of Ptolemy, the companion of Alexander, is lost for ever, so are the Journals of Alexander's Quarter Master General† Bæton and of Diognetus. Another life of the king written during his reign was destroyed by him for its fulsome flattery. The Journals of Onesicritus are lost, excepting some scattered fragments quoted by other authors.

Now, if the two extant histories agreed in local description, we might confidently take the guidance of either. But this is not the fact, and in no case are the discrepancies so great, as in the several descriptions of the Rock Aornos. It becomes therefore necessary to make our choice: to follow the one, and either to reject the other or to use it as a commentary. Where such necessity exists, few will hesitate to prefer the matter-of-fact history of Arrian to the more romantic narration of Curtius; the first being the work apparently of a cool investigator well versed in geography and in military tactics; whilst the beautiful language and vivid descriptions of Curtius are often the whole merit of his work.

This plan I purpose pursuing in my quest of Aornos. Arrian is the text, Curtius and Strabo are the commentaries. Curtius can often, and Strabo may sometimes, supply hints omitted by Arrian. All had access we may presume to Ptolemy's authentic history.

In commencing this search, it is necessary to start from some point, the general locality of which is beyond question. Let us take for this the Alexandria *εν παραπαμισαις*. Whether this be Beghram‡ near Cabul or Istalif is immaterial at present, since the route from either to India is the same.

Leaving Alexandria in Parapamisis, Alexander marched to the

\* I do not mention Plutarch's account, which is a sketch rather than a history.

† See Pliny, Book VI. p. 125, D. Holland's translation.

‡ Vibgraon, an excellent city; or Veuggron, a difficult city.

city Nikaia and there sacrificed to Minerva. Then he advanced to the river Koopheen, sending heralds to Taxiles and those bordering the Indus, commanding them to meet him on his advance.

It is very important to identify this Nikaia, of the name of which all traces seem to have disappeared from the country. Fortunately the travels of the Chinese Hiuan Tsang supposed to have been made in the 6th century of our era, throw some light upon the locality. In the *Journal* of this Society, we have two commentaries upon these travels, the one by Major W. Anderson, the other by Capt. A. Cunningham.

This traveller entering India from Cabul passes Lanpho, which both commentators identify as Lumghaun. Thence passing South-East a great chain (of mountains) for the distance of 100 Li (or 17 miles) he arrives at Na,ko,lo,ho—the Northern limit of India, on all sides girt with mountains, and having three stoupas or topes, two the work of Asóka.

This place Major Anderson identified with Nungnuhar, the ancient name of the Julalabad district, and Capt. Cunningham identifies it with the Nungnihar, or Nagara or Dionúsopolis of Ptolemy and the Nusa of Alexander's historians. Now the Nusa of Curtius had tombs of cedar and was colder than other places passed by the Macedonians who had just surmounted the snowy ridge of Paropamisas. It is certain that cedar groves could never have flourished in the valley of Julalabad where the hot winds blow, and that Julalabad must have been the hottest spot yet found in their route. Alexander, according to Arrian, came to Nusa after visiting Peshawur and the Indus and after the capture of Aornos. The site of Julalabad will therefore answer neither historian's account of Nusa. But in the name Nungnihar we have undoubtedly the Nikaia of Arrian, where Alexander halted to sacrifice to Athene, and the Fines Indiæ of Curtius, where on his arrival the border Chiefs and Princes thronged to worship him as the third of the sons of Jupiter who had come amongst them.

Julalabad is the natural halting and refreshing-place of all armies marching from Cabul to Peshawur. Here they recruit their supplies. Here in the open valley they can suffer their cattle to graze without fear of losing them. It is the limit also at which met in



former days the Indian race and the races of Khorussaun,\* and was the point at which Sooltan Maimood first encountered an Indian Army. The predominance of the Western races since the reign of Maimood has driven back the Hindoo tribes to within the boundary of the Indus. The robust race of Afghan and Asuf, transplanted to the mountains of Ghor by the conqueror Nabukht nasir seem easily to have mastered for themselves all the more rugged tracts, and to have driven out from the valley of Sohaut, or there to have reduced to entire subjection, the softer races of the East, even so early as the day of Alexander. But on the other hand, the greater wealth of India and the heroic courage of the Rajpootre tribes enabled them to maintain their empire wherever the climate was congenial to their constitution, or the surface suited to the evolutions of their cavalry.

I know of no place in the route of Alexander better indicated by local peculiarities and ancient name than the site of this Nikaia. Nungnuhar or Julalabad was a convenient spot from which to send heralds to the Indian tribes, as he could there entrust their safe conduct to Indian chiefs and princes.

Leaving Nikaia, Alexander advanced to the Koopheen river. No river had as yet been crossed, therefore no river is mentioned in the route, although there flowed upon his left hand the various mountain streams which united to the Cabul river form, at Julalabad, the Nagooman. These streams and the countries they water, could have had no attraction for Alexander: and to have involved himself in a campaign among mountains so worthless and so rugged, would have necessitated the deferment of his Indian expedition for another season. The river Koopheen *κωφην* being the first mentioned in the route is of much importance as a landmark.

We have seen that the united streams of the Cabul river, the Punjsheer, the Mingar, the Alishung and Kooner become at Julalabad the river Nagooman. In like manner the river Punjgowra and the Sohaut Sinde uniting in Sohaut there bear as one, various new names, according to the towns near which they pass or to the country they water. The names are Sohaut Sinde, Punjgowra.

\* Khorussaun is the old name of all Afghanistan, which formed the Eastern province of Persia.



Ashtnugr kè qwur, Abazye kè qwur, &c. The word Qwur signifying in the language of the country (viz. the Pushtoo), a river. The origin of the name Koopheen is manifest in the existence near the confluence of the Punjgowra and Sohaut Sinde of the site of an old town called to this day Koofa. The Koopheen was the river nearest to the Indus on the Western side; for, after the capture of Aornos, Alexander went through the Doaba of the Indus and the Koopheen. The modern name Loondi or Lundi (signifying the Short) seems to have been unknown at that time. It applies at present only to the united streams of the Nagooman and Sohaut Sinde from their junction to the Indus. And it appears to me that this portion only was called by the Greeks Koopheen.

I purpose giving the route as detailed by Arrian and by Curtius in parallel columns condensing the relations of military operations, so as to interrupt as little as possible the chain of localities.

*Arrian.*

And coming to the city Nikaia and having sacrificed to Athene, he advanced to the river Koopheen, sending on an ambassador to Taxiles and those bordering the river Indus, commanding them to meet him on his advance. And Taxiles and the other Uparchs\* meeting him presented gifts, the greatest sanctioned by the Indians, and promised to bestow the elephants in their possession to the number of twenty-five. Then dividing the army he sent Hephaistioon and Perdikkas to the country of Peukela (Pekawur) and even to the river Indus, having the corps of Gorgios and Kleitos and Meleagros and half the companion horse and the

*Curtius.*

Alexander having entered the confines of India, the princes of the nations hastened to execute his commands declaring him to be the third descendant of Jupiter who had appeared amongst them. That Father Bacchus and Hercules were known to them by tradition, but that he was visibly present to their senses. The king commanded them, whom he had benignly received, to follow him, being about to employ them as guides in his progress. When they ceased to arrive he sent in advance Hephaistioon and Perdikkas with a portion of the army to subdue those who should refuse his government, and to proceed to the river Indus, and there

\* Taxiles, we see, was one of several Uparchs on the borders of the Indus.

*Arrian.*

whole of the mercenary horse ; instructed to seize by force the places on their road or to reduce them to surrender : and on their arrival at the Indus, there to make all arrangements necessary for the passage of that river. With them were sent Taxiles and the other Uparchs. And they, on arriving at the Indus, arranged all this as directed by Alexander. But Astes, Uparch of the country of Peukela mutinying, was killed, and the city was destroyed. For the force of Hephaistion investing it reduced it in thirty days, and Astes himself was slain and Suggaios was ordered to take charge of the city. He had formerly fled from Astes and found refuge with Taxiles, and this formed Alexander's assurance of him.

But Alexander leading the shield-bearers and as many of the companion horse as had not been ordered to accompany Hephaistion and the corps of those styled foot companions, and the archers, and the Agrians and the mounted Javelineers, advanced against the countries of the Aspasioi and of the Gouraioi and of the Assakanoi skirting the river called Khoés\* (or Khoe or Khoa,) a

*Curtius.*

build boats by which to waft his army to the farther bank. They, because many rivers were to be crossed, so fitted together the vessels, as that they might be taken to pieces and being carried on waggons, be again put together. He ordered Craterus to follow him with the phalanx, and himself led the Horse and the Light Infantry, and drove together into the neighbouring city in a skirmish those who opposed him. After him followed Craterus, and that the nations unused to Macedonian warfare might be at the outset terror-stricken, he forbade that quarter should be given, burning the defensible cities which he had besieged. And whilst riding before the walls he was wounded with an arrow. He, however, took the town and having murdered all the inhabitants raged against the roofs. Thence having conquered an obscure people he arrived at Nusa. It chanced that the camp being pitched before the very walls in a woodland spot, the chill of the night there afflicted the body more than usual and that recourse was had to fire. Wherefore the woods being felled they set them on fire. The flame

\* Having this name only in the accusative, we cannot certainly determine the nominative. If it were Khóa we should have the word Khwur, the general name for a river in that country to this day.

*Arrian.*

mountainous and rugged road,\* and having with difficulty passed it, he commanded the throng of foot to follow step by step. But he, taking all the horse, and of the Macedonian foot 800, caused the heavy armed foot to mount on horseback, and pushed on rapidly, because he had heard that the neighbouring barbarians had fled to the mountain of that country and to defend such cities as were tenable. And attacking them at the first inhabited city on the road, those arrayed in front of the walls fled on the first assault and shut themselves within the city."

This city had a double wall, Alexander and Ptolemy were wounded before it. It was taken the day following, the inhabitants flying to the mountain which was near the city.

"Having levelled this city he came to Andaka, another city, which having entered on its surrender, he occupied: he left Krateros with the other foot commanders, to take forcibly any cities not voluntarily surrendering and to arrange all matters in

*Curtius.*

spreading enveloped the tombs of the citizens. They were of ancient cedar and, taking fire, spread widely until the whole was levelled with the soil. And from the city first the bark of dogs then the murmur of men was heard. And then the citizens perceived an enemy and the Macedonians that they were before the city. And now the king led up his forces and besieged the city, when those of the enemy who tried conclusions were overwhelmed with darts. Therefore some tried surrender, others fight: their difference being known, he commanded to surround those who hesitated and to abstain from slaughtering them, and at length wearied with the evils of a siege they surrendered. They gave out that they were founded by Father Bacchus and this was their real origin. The city is founded beneath the roots of the mountain which the inhabitants call Meros: whence the Greeks have drawn the license of fabling that Father Bacchus was hidden in the thigh of Jupiter. The

\* There seems to be here some misprint. The text has *πορευθεις δε παρα τον χονην καλουμενον ποταμον, ορεινην τε οδον και τραχειαν, και τουτον διαβας χαλεπως*. Had it been *την* there had been no doubt that it was the road which he passed with difficulty but the masculine gender has led Rooke in his translation (which I have procured to compare with my own) to translate it, "when he had with some difficulty crossed that river." It seems to me more probable that Arrian wrote *ταυτην*.



*Arrian.*

that district according to their judgment.

“xxiv. But he, leading the shieldbearers and the archers and the Agrians and the corps of Koinos and Attalos, and the squadron of horse and more than four Ipparchs of the other companions and half the mounted archers, advanced to the river Euaspla, where was the Uparch of the Aspasioi and, having passed over much ground, the next day approached the city. But the barbarians, perceiving his approach, set fire to the city and fled to the mountain.”

Many were slaughtered ere they could reach the rugged country, and Ptolemy, seeing their leader on a hill, attacked and slew him, and spoiled him after a hard contest for the body: overpassing the mountain, Alexander arrived at a city called Arigaïos or Arigaion. “There also the army of Krateros rejoined him, having fulfilled all the king’s commands. And he directed Krateros to re-people that city which he deemed convenient for a colony with volunteers of that neighbourhood and with the sick of the army.”

He then pursued the fugitives and encamped at the foot of the mountain which they occupied. And Ptolemy, being sent to forage,

*Curtius.*

king ascertaining the situation of the mountain from the inhabitants, having sent on refreshments climbed to the summit. Many ivies and vines are produced throughout the mountain, perennial springs abound. The juices of the fruits also are various and wholesome, the earth fostering the fruits of chance sown seeds. Laurels also and berries and much rural wood are found in those rocks. I think indeed that moved by no divine impulse but by wantonness they wandered through that grove, crowned with ivy and vine leaves like Bacchannals. The mountain ridge and hills resounded with the voices of the many thousands adoring the presiding deity of that grove. Then licence arising as generally happens, spread throughout the whole band. For in mid-march they prostrated their bodies upon the grass and gathered boughs. And the king not averse from casual indulgence, feasted, abundantly, the whole band, devoting the army for ten days to the service of Father Bacchus, &c.

Thence he arrived at a region called Dædala. The inhabitants quitted their dwellings and fled together to the pathless and



*Arrian.*

sent report to Alexander that the fires of the enemy exceeded those of their own camp. Alexander leaving a party to protect his camp led up his force in three columns upon the enemy. Ptolemy again had to attack a force upon a hill. After much fighting the enemy were routed leaving 40,000 prisoners and above 230,000 oxen, of which Alexander selected the strongest to send to Macedonia to till the land.

“Thence he came into the country of the Assakenoi, for he had heard that they had made the most warlike preparations, having 20,000 horse and above 30,000 foot and 30 elephants. Krateros having already fortified the city, to build which he had been left behind, brought up to Alexander the heavier armed of the force, and the War engines in case they might be wanted for a siege. But Alexander, leading the companion horse and the mounted Javelineers and the corps of Koinos and of Poluperchos and the Agrians, a thousand strong, and the archers, came against the Assakenoi. For he went through the country of the Gouraioi and with difficulty passed the river (called after the country Gouraios) on account of its depth, its vio-

*Curtius.*

woody mountains. Therefore he passed Acadera alike deserted of its inhabitants by flight. Therefore necessity altered the form of warfare. For dividing his forces he appeared in arms at many points at once. And all who awaited the enemy, overwhelmed, were conquered with like slaughter. Ptolemy took more, Alexander larger cities; and again he re-assembled his divided forces. Then the river Choaspis being past he left Cœnos (Koinos) to besiege an opulent city (the inhabitants call it Bezira) he himself came to Mazaga. Assakenos, whose kingdom it was, having lately deceased, his mother (perhaps the child's mother is meant) Cleophes, presided over the country and the city. Thirty thousand foot held the town, protected not only by its position but by art also. For where it faces the East it is girt with a torrent, which with its precipitous banks impedes access to the city. On the West and South, as if by art, nature has piled up towering rocks, below which caverns and chasms, worn by ages, yawn to great depth: and where they cease, a ditch of mighty labour interposes. A wall of thirty-five stadia ( $4\frac{1}{8}$  miles) encloses the

*Arrian.*

lent current, and that round boulders in the river were dangerous to those fording. But the barbarians learning Alexander's approach, not having courage for a pitched battle, distributed themselves amongst their several cities, purposing to defend them.

“xxvi.—And Alexander came first to Massaga the largest of those cities.”

The siege of Massaga occupies two pages. The enemy had 7,000 mercenary troops of the neighbouring districts (the Rohillas, probably, who still swarm in that neighbourhood). These sallied bravely upon the Macedonians as they were encamping. Alexander feigning to retreat, drew them away from the city to an eminence. Then suddenly turning back upon them, routed them and drove them back to the town, leaving 200 slain. Alexander at once closed upon the walls and rained in arrows and, easily advancing his engines to the base, effected a partial breach that day, which, the Macedonians carried but could not retain. The third day he dropped a bridge from the engine upon the wall, but it broke beneath the impetuous rush of his soldiers and many of them were killed. Another bridge was pre-

*Curtius.*

city; its base of stone, its superstructure of unburnt brick. Stones brace together the bricks, interposed that the softer may rest upon the stronger material, when the soil is flooded with moisture. That nothing might be wanting, strong beams are superadded, upon which planks being fastened, not only cover the walls, but render them pervious. Alexander contemplating these defences and at a loss, because the chasms could be filled with nothing less than a hill, nor without filling them could he advance his engines to the walls, was wounded by an arrow from the wall. The arrow lighted upon his thigh and the head being plucked out he ordered them to place him in his saddle, sitting in which he continued the operations without attending to the wound. After awhile, when the leg hanging down and the blood drying, the wound in cooling aggravated his pain, he is reported to have observed, that he was styled son of Jupiter, yet felt the evil of a body subject to pain. Nevertheless he no sooner found himself in camp than he oversaw all things and dictated his commands. Therefore because it was so ordained, some pulled down the suburbs and

*Arrian.*

pared, but the enemy still resisted stoutly. Eventually however, their leaders being killed they, after a vigorous defence, sent heralds to Alexander. Alexander granted them terms on condition that the mercenaries should take service under him. This they accepted, but, encamping apart upon a separate eminence, in the night prepared to fly, being too honorable to bear arms against their own countrymen. Alexander learning this, destroyed them in the act of flight. He deprived of all its defenders the city captured by force. The mother of Assakanos and her son were taken. Alexander lost in all this siege only twenty-five men.

“Thence he despatched Koinos to Bazira, being of opinion that the Baziroi on learning the destruction of the Massagoi, would surrender of their own accord. But he sent Alketos and Demetrios the Ipparch to Ora another city, commanded to enclose the city in a wall until his arrival. And the citizens sallied upon Alketos’s force. The Macedonians, however, without difficulty drove them back into the city. And the contest with the Baziroi did not advance under Koinos, for trusting to the great

*Curtius.*

dragged along mighty heaps of material for a mound. Others cast into the cavities the roots of large trees and rocks to swell the heap. And now the pile was level with the earth’s surface. Therefore they erected the turrets, which works were completed by the ardor of the troops in nine days. The king, with his wound still green, went to inspect the works, and, having praised the soldiery, ordered them to advance the engines, from which a mighty flight of darts is cast upon the defenders. But especially the moving towers terrified men unused to such a sight: that such vast masses should be brought up without visible aid, they believed to be through the agency of the gods. The battering-rams also and the massive darts launched from the engines, seemed unsuited to mortals. Therefore hopeless of saving the city, they retired to the citadel. Whence, since nothing but surrender would serve, their ambassadors waited upon the king to implore pardon. Which gained, the queen with a large concourse of noble women, went in procession, pouring out wine from golden goblets. She, placing her young son at the knees of the king, not only pro-



*Arrian.*

strength of the place, for it was upon a hill and completely fortified, they would not come to terms of surrender. Alexander knowing this, marched for Bazira. But knowing also that certain of the barbarians of the neighbourhood had found admittance to the city Ora, intending to hide there, being sent by Abisares, he came first to Ora. He ordered Koinos to invest with walls the city of the Baziroi, a place of strength leaving in the works a garrison sufficient to prevent those in the city from having confidence to attack the works, but he, leading the remainder of the troops, was to come to Alexander. And they of the Baziroi, seeing Koinos departing with the bulk of his army and despising the Macedonians as unworthy to meet them in battle, sallied out into the plain, and there commenced with them a stout battle, in which the barbarians lost five hundred men, and of them were taken alive seventy. The remainder, flying together into the city, were there shut up more strongly in

*Curtius.*

cured pardon but even the grace of his former fortune: since she is called queen: and some believe, that the grace was accorded rather to her beauty than to her misfortunes. Certainly she afterwards bore a son, however begotten, whose name was Alexander.

11.—Hence having sent Poly-sperchon with an army against the city Ora, he conquered the rude citizens in battle and having followed them, driven within their defences, reduced the city to surrender. Many obscure towns, deserted of their inhabitants came into the power of the king, whose armed inhabitants occupied a rock called Aornos, which tradition reported to have been besieged in vain by Hercules and to stand apart upheaved by earthquakes.\* A certain elder well acquainted with the locality, approached Alexander, who was at a loss how to proceed (because the rock was on all sides broken and precipitous) promising for a reward to show him access to the rock. Alexander promised him eighty talents and retaining one

\* This passage “Hanc (i. e. petram) ab Hercule frustra obsessam esse, terræque motu coactum absistere, fama vulgaverat” is obscure—the word *coactum* agrees neither with *Hercule* nor with *petram*. I should suggest its being made *coactam*, which reconciles the difficulty; and after consideration I have adopted this reading. Our respect for Hercules would not improve, could we think him to be frightened by an earthquake.



*Arrian.*

the wall of investment. And the siege of Ora became easy to Alexander. Indeed attacking the walls by assault, he mastered the city and took the elephants that had been left behind.

xxviii.—And they of the Baziroi, when they heard this, despairing of their own cause, deserted the city at midnight. They fled to the rock as did those other barbarians. For abandoning all their cities they fled to a rock in that country, called Aornos. For this mighty mass of rock is in that country and tradition relates concerning it, that the rock remained impregnable to Hercules the divine. Whether indeed the Theban or Tyrian or Egyptian Hercules came to the Indus, I affirm not, I am inclined to think that he came not. But whatsoever things are difficult, men, to enhance the difficulty, fable them to have been impracticable to Hercules. And concerning this rock, I know not that it is numbered by tradition amongst the labors of Hercules. The circuit of this rock is rated at upwards of 200 stadia (14 miles). The altitude above the

*Curtius.*

of the sons as a hostage, dismissed him to make good his offer. Mulinus, the king's secretary, was placed in command of the light-armed. He thought fit to plant them on the mountain crest by a path which might baffle the enemy's vigilance. This rock does not, like most rocks, terminate by gentle slopes in a lofty pinnacle but is set up, most like a goal, whose base is broader, whose higher portions are more restricted, whose summits shoot into a sharp peak. Its roots the Indus enters scarp'd on both sides with lofty rocks: on the other hand were interposed gulfs\* and quagmires, nor was there any way of assailing the rock but by filling them. A forest was at hand, which the king ordered to be felled and that the naked trunks should be cast in, because the branches clad with leaves impeded those bearing them. He himself cast in the first trunk, and the shouts of the army an index to their alacrity followed; none grudging the labor, because the king shared it. They filled the cavities by the seventh day, when the king ordered the archers and the Agrians to struggle

\* Eluvies is the word. If quagmires were to be filled up, the rock Pehoon must be Aornos. There is no other on the Indus requiring such an expedient. I have translated Voragines, gulfs, as leaving their nature in uncertainty.

*Arrian.*

earth's surface at 11 stadia (4125 feet) and the ascent very difficult even with aid of the hands, and there is abundance of water at the summit of the rock, and pure springs are welling, so that the water overflows, and wood and good soil abound, sufficient for a thousand men, should they cultivate. And Alexander hearing these things was seized with the desire to capture also that *mountain*, not the less on account of the fables related of Hercules. He established garrisons in Ora and Mas-saga for that country and secured with a wall the city Bazira. And the force of Hephastioon and Perdikkas, walling another town (it's name was Orobatis\*) and leaving in it a garrison, came even to the river Indus, that they might on arrival there, prepare means of bridging the river Indus as ordained by Alexander. But Alexander appointed Nikanor of the companions Satrap of the district bordering the Indus. He had come first to the river Indus and had got possession by surrender of the city Peukela, sited not far from the river Indus and had appointed in it a Macedonian garrison and Philip, governor of the garrison. But he subdued

*Curtius.*

through the difficulties, and selected thirty of the most courageous youths from his own cohort. Over them, he appointed Charus and Alexander, whom the king reminded of his name as being common to both. And at the outset on account of the imminence of the peril, it did not please that the king should be engaged. But when the trumpet sounded, being a man of heady valor, he turned to his guards and ordering them to follow him, first attacked the rock. Nor after that did any Macedonian hold back, but, quitting their several posts, voluntarily followed the king. Wretched was the case of many whom the river sucked in as they fell from the broken rocks, a sad enough spectacle even for those not endangered: but when they were admonished of their own peril in another's destruction, pity being converted into fear, they wept, not the defunct, but themselves. And now had they attained to where they could retire without destruction only as victors, the barbarians rolling down huge rocks upon their approach, with which being struck they fell headlong from their unstable and slippery footing. Alex-

\* The ruins of Arabut are still seen on the Loondi left bank near Nowashihr.

*Arrian.*

other small towns built on the river Indus. Kophaïos and Assogetes, Uparchs of the country attending him. And coming to the city Embolima, sited near the rock Aornos: Krateros was left by him with a portion of the army to collect into the town much corn and other commodities suitable to a prolonged delay, that the Macedonians sitting down might weary out the defenders of the rock with a lengthened siege, if they could not carry it by assault. But he, taking the archers and the Agrians and the corps of Koinos, men selected from the other phalanx for their activity and perfect equipment and 200 of the companion horse and 20 of the mounted archers, approached the rock and that day encamped where it appeared to him convenient, on the morrow advancing a little, even to the rock, he again encamped.

xxix.—And certain of the neighboring inhabitants, there, approached him, and, surrendering themselves, offered to lead to an assailable point of the rock, whence it would not be difficult for him to take the place. And with them he sent Ptolemy son of Lagos, the life guardsman, leading the Agrians and the other light armed and the selected or

*Curtius.*

ander and Charus however, escaped, whom the king had sent in advance with the thirty selected youths and now began to fight feebly. But as the barbarians hurled their darts from above, they were oftener stricken than they struck. Therefore Alexander mindful of his name and promise, whilst fighting rather fiercely than cautiously, being pierced through was overthrown. Whom when Charus beheld extended, he rushed upon the enemy forgetful of all but revenge, and slew many with the javelin, some with the sword. But, since so many were opposed to one, he soon lay lifeless upon the body of his friend. The fight was very unequal, the king moved by the destruction of his bravest youth and other soldiers, gave the signal for retreat. It proved their safety that they retired gradually and intrepidly: and the barbarians satisfied to have repelled the enemy, did not press upon them as they retired. But Alexander when he had determined to abandon the enterprize (since there was no hope of seizing the rock) nevertheless made a show of persevering in the siege. For he ordered the passes to be closed and towers to be brought up and



*Arrian.*

the shield-bearers; instructed that on taking the place they should hold it in force and should signal that they possessed it. And Ptolemy threading a rugged and difficult path, escaped the notice of the barbarians holding the country, and fortifying it by a circular palisade and ditch, lighted the beacon upon the mountain; that it might be seen by Alexander, and it was seen by its flame, and Alexander next day advanced the army: but the barbarians opposing him, he did not advance far on account of the steepness (of the hill). But when the barbarians perceived the ascent to be impossible to Alexander, they turned upon Ptolemy's force and attacked it, and between them and the Macedonians a stout battle was maintained, the Indians earnestly endeavoring to tear up the palisade, Ptolemy to defend the post. And the barbarians losing victims in the skirmish, at night fall retired. Alexander selecting certain of the Indian deserters of whom he held security, sent the Indians by night to Ptolemy bearing letters. Thus it was written. "Whenever he himself (Alexander) should attack the rock, he (Ptolemy) should come down upon the barbarians

*Curtius.*

fresh troops to succeed to the wearied. Which pertinacity being observed, the Indians for two days and two nights banquetted with ostentation not only of confidence, but of victory, beating drums according to their custom. On the 3rd night however, the sounds of the drums had ceased to be heard, and torches glowed over the whole rock which the barbarians were lighting that their flight in the darkness of night over pathless rocks might be secured. The king having sent Balacros to reconnoitre, knew that the rock was deserted by the flight of the Indians. Then at a given signal as they shouted all together, Fear struck the fugitives in their disorder and many, as if close prest by the enemy, precipitated themselves over the slippery rocks and pathless crags. More, mutilated in some member of the body, were deserted of the unwounded. The king victor rather of the place than of the enemy, nevertheless offered thanksgiving to the gods and sacrifices as for a great victory. Altars were built on the spot to Minerva and to Victory. To the leaders of the enterprise whom he had ordered to mount lightly armed he rendered the promised reward with fidelity, although



*Arrian.*

on the mountain, not being contented to guard the post: the Indians being thus attacked on both sides would be perplexed." And he at day break (5th morning) having got under arms from camp, led on the army to the ascent by which Ptolemy had climbed unseen; being of opinion, that if thus ascending he could form a junction with Ptolemy's force the work would be far from difficult to him. And thus it proved, for at mid-day ensued a stout battle between the Indians and the Macedonians, these endeavoring to force the ascent, those striving to hurl them back. And when the Macedonians were not prevented, one succeeding another whilst the foremost refreshed; with difficulty toward the cool of the day (evening) they mastered the passage and formed a junction with Ptolemy's force. Thence when the army were come up, he again led them to that rock, for the ascent was still difficult. The same day however, he completed his object, on the morning (6th) he allotted to each camp to cut palisades a hundred per man: and they were cutting them and he raised a mound commencing on the crest of the ridge where they were encamped even to the rock, a large mound (or trench) thence it seemed to him possible to reach the defenders with his arrows, and the darts might be hurled from the engine. And they dug for him, each working in turn, and he stood a witnesser and praiser of that performed with enthusiasm, but the prompt chastiser of neglect.

*Curtius.*

they had somewhat failed of their engagement. The government of the rock and of the adjoining region was made over to Sisocostos. 12. Thence he proceeded to Embolima, and when he discovered that the straits of his road were beset by one Eryx with 20,000 armed men, he made over the heavier battalion of the army to Cœnus to be led by gentle marches, whilst he, advancing with the slingers and archers, drove out those who beset the forest and opened a road to the army following him. The Indians, whether of hatred to their leader or to curry favor of the conqueror king, attacking the flying Eryx, slew him and brought his head and his arms to Alexander. He gave impunity to the deed, but denied honor to the example. Hence he arrived at the Indus in sixteen marches and found all prepared by Hephaistion for the passage according to his orders.

XXX.—On the 1st day, the army dug for him about a stadion. On the morrow (7th) they slinging at the Indians from the mound already raised, and the darts being launched from the engine, repelled the sallies of the Indians upon the diggers. And in three days they dug for him even to the works, (end of 8th) on the 4th day (9th)\* a few of the Macedonians gallantly carried a small hill, even with the rock, and Alexander, on the alert, advanced the trench, purposing to connect it with the hill which those few already held for him. But the Indians astounded at the unparalleled audacity of the Macedonians carrying the hill, and already beholding the mound united (to it) abstained from defending themselves, but sending their heralds to Alexander, expressed their readiness to surrender the rock, if he would make a covenant with them. He suspected that they were wearing out the day in negotiations, that at night each might flee to his own. And when Alexander perceived this, he gave them time for the flight, and removed the guards posted around them. And he waited until they should commence their flight, and at that moment taking 700 body-guard and of the shield-bearers to the adventure of the rock; himself first ascended it, and the Macedonians, hauling up one the other, ascended in succession. And they routing the departing barbarians at a signal, many were slain in flight, and the fugitives being terrified threw themselves down the cliffs and perished. The rock thus came into the hands of Alexander which had remained impregnable to Hercules. And Alexander burnt incense upon it and appointed a garrison, entrusting to Sisicostos the superintendence of the garrison, who from the Indians had heretofore behaved bravely against Bessos. And Alexander occupying the Baktrian country campaigned in his company, and this appeared a pledge for the best. Quitting the rock, he invaded the country of the Assakanoi. For he had heard that the brother of Assakanos, having elephants, and many of the neighbouring barbarians had fled together to that mountain. And coming to the city Durta he (found) none

\* Rooke in his translation thus renders the passage: "But on the fourth, when some Macedonians had begun to build a mound opposite to the rock which was designed to be of equal height therewith." I prefer my own translation. The reader may judge for himself: Arrian says *τη τεταρτη δε βιασαμενοι των Μακεδωνων ου πολλοι κατεσχον ολιγον γηλοφον ισοπεδον τη πετρα*. Lib. IV. ch. XXX.

of the inhabitants there, nor in the country about the city. On the morrow he sent Nearchos and Antiochos, Chiliarchs of the shield-bearers, and commanded Nearchos to lead also the Agrians and the light-armed. To Antiochos (he gave) his own regiment and two others with it. He sent them to explore the country, and if possible to seize a few of the inhabitants, from whom he might learn particulars of others of that country and especially of the elephants. But he then came to the river Indus. And the army made for him the road in advance: that country being otherwise pathless. There he seized a few of the barbarians and learnt from them, that the Indians of the country had fled to Abisares, but had left the elephants to feed at the river Indus, and he ordered them to lead the way to the elephants. There are many Indians, hunters of elephants, such Alexander immediately summoned around him and hunted the elephants with them. And two of the elephants were killed, having fallen from the cliffs during the chase. But the rest being captured were brought mounted, and were incorporated with the army. And because timber susceptible of being wrought, grew upon the river, he made the army fell it and built boats, and they\* were brought upon the river Indus even to the bridge which Hephaestion and Perdikkas had already made.

## LIB. V. CAP. 1ST.

Alexander went through all the country which lay between the Koopheen and Indus rivers and where the city Nusa is said to be built being founded by Dionusos, &c. &c.

And when Alexander arrived at Nusa, the Nusaioi sent him their chief (named Akouphis) and thirty elders, the most esteemed, with him, imploring Alexander to release the city for the sake of the god. The elders having entered Alexander's tent and having surprised him dusty with travel, sitting clad in his other arms, his helmet

\* Rooke in his translation thus renders the passage " which (the vessels) *being launched into the river he and his forces were thereby conveyed* to the bridge." Of this passage all the words in Italics have no corresponding Greek words according to my edition of Arrian, who says simply *και ναυς εποησαν, και αυται* (i. e. the boats which are feminine) *κατα τον Ινδον ποταμον ηγοντο ως επι γεφυραν.* Lib. IV. ch. XXX.



lying beside him and his hand grasping a spear were amazed at the sight and falling to the earth long held silence. But when Alexander signed to them to rise and commanded them to take confidence, Akouphis thus begun :

O king, the Nusaioi entreat you for respect of Dionusos leave them free and their own masters. For Dionusos, when having conquered the Indian race he returned to the Hellenic Sea, from the worn out of his army (these had he and the Bacchoi) founded this city in memorial of his wandering and of his victory to after generations ; even as thou thyself hast founded Alexandria in the Kaukasian mountain and another Alexandria in the soil of Egypt and many others hast thou already founded and shalt found from time to time even as thou hast shown greater exploits than Dionusos. Dionusos a suredly called this city Nusa, after his Nurse Nusa, and the country Nusaia, and that mountain which is near the city, Dionusos named Meron, because according to fable he grew in the thigh of Jupiter. Thence have we dwelt in Nusa the free, and we are free and are a commonwealth. And of our origin from Dionusos, be this to the testimony, "the ivy which springs in no other Indian soil grows with us."

Alexander believes their tale, gives freedom to the city and takes three hundred of their horsemen into service.

"And the desire seized Alexander to see the place, of which the Nusaioi boasted such memorials of Dionusos. To visit Mount Meros with his bands of horse and foot companions, and to see on all sides the ivy and the laurel and wood of all kinds, and to see the shade and that the wild beasts in it were of every country, and the Macedonians beholding with joy the ivy, beheld after a long interval (for there is no ivy in India, not even there where are vineyards) they quickly made crowns of it, and wearing garlands sang aloud, and invoked Dionusos and the surnames of that god. Alexander also burnt incense to Dionusos and banquetted together with the companions."

I have preferred giving the extracts continuously for the benefit of those who may not have means of reference to the histories. I may have occasion to quote separate passages in illustration of my argument.



It is impossible to read the above narratives with the knowledge we at present possess of Sohaut, without the conviction that Alexander conquered that country before he attacked Aornos. The evidence of this is, his having entered the country of the Gouraioi and crossed their river Gouraios, called to this day Punj Gowra, the people still retaining their name of Gowr: and that the ruins of Masagorh in the Seh Bhoochnia valley of Sohaut (see map) exactly agree with Curtius' description of Mazaga (Arrian's Massaga). Whilst the people of Massaga were the Assakani or subjects of Assakhan, and the people of Mazagôr are the Assazye sons of Assa. We have therefore only to decide which route Alexander chose in the invasion of Sohaut.

Now from Julalabad three routes into Sohaut were open to him.

1st. Up the left bank of the river Kooner, over hilly but not mountainous country upon Bajore, which the route attains about that bend of the Punjgowra (Gouraios) where stood Khar\* i Bungalish the old capital of Bajore. There crossing the river Gouraios he would have entered the country of the Gowr (Gouraioi) and have conquered successively, the Gowr, the Abakhail, the Assazye and Ashakhail, and would then have besieged Masagorh in the Seh Boochnia valley, afterwards finishing the conquest of western Sohaut in the subduction of the Drooskhail in the Sukra valley. Then crossing the Suastus, (Sohaut Sinde,) he would have conquered the richest, most powerful and most densely peopled moiety of the Sohaut valley from North to South, and, leaving the valley by the southern pass, have proceeded to the eastern Eusufzye to besiege Ora (Oond) and Bazira (Baja).

By the 2nd route from Lalpoor directly north, he would have traversed the hilly country of the Momunds and entering Bajore from the south, would then have progressed as described above in the 1st route.

By the 3rd and more obvious route crossing the Nagooman at Lalpoor, he would have threaded the Caroppa Pass, have entered and conquered the Doaba of Shubqudr, have crossed at Ashtnugr the river of the Eusufzyes, or, as they still call themselves, Asupzye, Aspasioi, i. e. the Issupqwur and would have found himself in the

\* Khar signifies in the language of the country a town or village.

country of the Aspasioi. He would thence have made a forced march through the pass into Sohaut, have conquered that rich and powerful country eastward of the river; have re-crossed the Sohaut Sinde above its junction with the Punjgowra (Gouraios); have subdued the Sukra valley, and then have laid siege to Masagorh in the Seh Booschnia valley. Then finishing the conquest of western Sohaut, with perhaps the Gowr tribe, he would have crossed the Punjgowra (Gouraios), have conquered Bajore, and have returned through Ashtnugr and the Eusufzye, in progress to Hoond and Baja on the Indus.

It may be worth while to lay side by side the features of the 1st and 3rd routes with the route laid down by Arrian:

| <i>According to 1st<br/>and 2nd route.</i>                                                                                                                                                                                                                                                                         | <i>Route by Arrian.</i>                                                                                                                                                                                 | <i>By 3rd route.</i>                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Crosses the unfordable river Nagooman. Skirts left bank of the Kooner river over hilly ground, crosses the hills into Bajore and debouches upon the old capital, Khari Bungaish. (By the second route he reaches Khar i Bungaish by Munni, Bhayd, Nawagye or by diverging to the east by a village called Undaka). | Rugged pass thro' a country bordering the river Khoés or Khoee or Khoá. Nameless town. Andaka surrenders and is occupied. Krateros left to settle a country. River Euaspla, called by Curtius Choaspes. | River of Nagooman or Qwur Nagooman. Lalpoor. Doaba of Shubquadr. River of the Eusufzyes which may have been Qwur Asuf or Khoaspes, or Asupqwur Euaspha, being the united streams of the Sohaut Sinde and Punjgowra. |
|                                                                                                                                                                                                                                                                                                                    | Uparch of the Aspasioi.                                                                                                                                                                                 | Asupzye as they still call themselves in the valley of Ashtnugr.                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                    | Two very long marches to a city. Inhabitants burn it, and flee to the mountains.                                                                                                                        | Tungipass into Sohaut leading upon the old capital Birikot and upon many towns of 1000 to 1500 houses.                                                                                                              |
|                                                                                                                                                                                                                                                                                                                    | Battle on the mountain side. Ptolemy kills and spoils the leader of the Indians.                                                                                                                        | Conquest of eastern Sohaut a very populous and warlike country abounding in strong mountain posts                                                                                                                   |

In Bajor.

| <i>According to 1st<br/>and 2nd route.</i>                                                                                                          | <i>Route by Arrian.</i>                                                                                                                 | <i>By 3rd route.</i>                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                     | Transit of the mountain.                                                                                                                | on the spurs which abound upon the Sohaut Sinde River.                                                                                                                                                       |
|                                                                                                                                                     | City Arigaïos* or Arigaion burnt by the inhabitants.                                                                                    | From one tributary valley to another.                                                                                                                                                                        |
|                                                                                                                                                     | Battle on the mountain top,† capture of 40,000 men and 2,30,000 oxen.                                                                   |                                                                                                                                                                                                              |
| Fords the Punjgowra by a ford difficult and dangerous in the spring from the rapidity of current and size of the boulders.                          | Passage of the Gou-raïos by a ford difficult and dangerous from the strength of the current, and the round slippery boulders at bottom. |                                                                                                                                                                                                              |
| Country of the Gowr tribes still so called.                                                                                                         | Country of the Gou-raïoi.                                                                                                               | Country of the Gowr tribe to this day.                                                                                                                                                                       |
| Conquest of western Sohaut where the Assarzyes or sons of Assa (Khan) Assacanus, are still the most important branch of Eusofzye of western Sohaut. | Country of the Assakenoi or subjects of Assakanos.                                                                                      | The most powerful tribe on the west of the Sohaut Sinde, are still the Assazyes, sons of Assa and the Ashakhail or tribe of Asha dwelling together in the valley contiguous with that occupied by Massagorh. |
| Siege of Massagorh which seems to exist as a ruin in the Seh Boochnia valley as described by Curtius.                                               | Siege of Masaga chief town of Assakanos,‡ described by Curtius to be girt on three sides with chasms.                                   | Siege of Massagorh the chief fortified town western Sohaut the ruins of which still exist as described by Curtius in the valley                                                                              |

\* This name may be Aragaon or Hurrigaon, or Oorigaon.

† This denotes a most populous and rich tract, and can refer, I think, only to eastern Sohaut.

‡ Assakanos was a chief or king. Curtius styles his mother Queen. It is probable that he was the dominant chief of Western Sohaut, and, as such, Lord paramount of Massagorh, although it is not *in* the valley at present occupied by the Assazye or sons of Assa.

| <i>By 1st and 2nd Routes.</i>                                                                                                                                                                                                         | <i>By Arrian.</i>                                                                                                      | <i>By 3rd Route.</i>                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Koinos sent to besiege Bajá, the ruined fort of which still remains on a hill near the present village, see the Eusofzye country near the Indus.                                                                                      | Attalos, and Alketos sent to besiege Ora (Ωρα.)                                                                        | of the Seh Bhoochnia adjoining that of the Assazye.<br>Attalos and Alketos sent to Oond.                                                                                                                                                   |
| Alketos Demetrius and Attalos sent to besiege Ora, i. e. either the ancient Oond, of which the old sites are still called Oora; or Ooria an old fort strongly sited N. east of Gunduf. The people of Bajá flee to the mount Mahabunn. | Koinos sent to besiege Bazira, builds around it a wall, described as on a height and very strong.                      | Koinos sent to besiege Baja in the Eusufzye.                                                                                                                                                                                               |
| Hephaistioon and Perdikkas fortify Arabutt (ruins still existing) to protect the ferry of the Loondi or Koopheen river.                                                                                                               | Baziroi flee to Aornos.<br>Hephaistioon and Perdikkas fortify the town Orobatis.                                       | Baziroi flee to Mt. Mahabunn.<br>The ruins of Arabutt exist on the left bank of the Loondi river near Nowashihr. It was no doubt fortified and garrisoned to keep open the ferry or bridge of boats connecting Peshawur with the Eusufzye. |
|                                                                                                                                                                                                                                       | Alexander visits the Indus and having taken Peukela by surrender, inserts a Macedonian garrison under Philip.          | The capture of Bazira or Baja set Alexander free to visit Peshawur, called still Pekawur.                                                                                                                                                  |
|                                                                                                                                                                                                                                       | Appoints governors over the countries bordering the Indus.<br>Alexander marches to Embolima, a town sited near Aornos. | This certainly gives the impression that in marching from Peshawur to Embolima, Umb Balima, he went up the Indus. Umb is still on the right bank of the Indus at the highest point accessible to an army, and                              |



| <i>By 1st and 2nd Routes.</i> | <i>By Arrian.</i> | <i>By 3rd Route.</i>                                                                                                                   |
|-------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------|
|                               | Siege of Aornos.  | about sixty miles above Atuk.<br>Balimah is one of the spurs of the Mahabunn directly above Umb, and is said to have once held a fort. |

On careful comparison of Arrian's narrative with these routes, the following difficulties are manifest. After crossing the river Khoes, Alexander pauses not, having apparently there met with no opposition, but pushes on by a forced march to a considerable city. This in all probability was Birikot the old capital of Sohaut, founded by that Raja Virahat in whose service the Pandoos, when disguised as menials, engaged. The extensive operations following and especially the capture of 40,000 prisoners and 230,000 head of cattle could scarcely have occurred any where but in the populous and productive valley of eastern Sohaut, where every village is a town in dimensions. Alexander having effected this, could not have needed to cross the Punjgowra river (Gouraios) in order to enter the country of the Gouraioi and Assakanoi (Gowr and Assazy), nor to besiege Massagorh (Massaga) which according to my best intelligence lies in the Seh Bhoochnia valley. He would have had to cross over the Sohaut Sinde which has a good bottom and no boulders. His course then would lie to Massaga *first*, and *afterwards* to the Gouraioi, dwelling still upon the Punjgowra river. And it is certain that Alexander would not take Massagorh without completing the conquest of the important valley of Sohaut: a valley which can muster 80,000 fighting men. Had not the river Gouraios and the Gouraioi been mentioned I might have supposed that he did not visit Sohaut, but that the Massaga taken by him was a Moosagurh which is said to exist as a ruin near Besuk belonging to the Moosakhail.

Again, after the capture of Massaga, two divisions of the army are sent at once to besiege Bazira and Oora, which, if we are to identify with Bajá and Owra or Ooria on the Indus, was a long march through a hostile country to be accomplished without inci-

dent. It is very true that an Owra is said to exist in Sohaut not far from Massagorh, and that a Beejapoor is said to exist in the Abakhail valley. But I have not been able to discover any Aornos near either of these: and, as I have before observed, if Aornos be not close to the Indus we have absolutely no clue to its discovery.

If we try these routes by the narrative of Curtius we shall lead Alexander by route the 1st or second into Bajor, thence to the Koh i Mohr Baba, which in following Curtius, we must identify with Mt. Meros. He would then have crost the Sohaut Sinde into eastern Sohaut and after visiting Doodial and the Kaldura (*Dædala* and *Acadera*\*) have past south to Ashtnugr, where recrossing the Qwur Asup (*Choaspes*) he would have been in the valley of Shubdudr and from thence have proceeded north to Massagorh. But it is difficult to believe that such could have been his course:—that he should have left Sohaut half conquered to visit Ashtnugr, or that, wishing to besiege Massaga and having collected his war-engines for the purpose, he should have needlessly recrossed the river Choaspes in order to get a road impracticable to his war engines. Curtius therefore lends us no aid. And if the position of Massaga in my sketch be correct, even Arrian's narrative must be regarded as a general account of the operations, not as copied from the journals of those who accompanied the army.

It appears to me probable that the real course of Alexander from Julalabad (*Nikaia*) was to Lalpur, thence to Shubqudr. Then across the Issupqwur or Qwur Issup (*Easpla* or *Choaspes*) to the district of Ashtnugr to subdue and govern which and the Shubqudr Doaba he left Krateros and others for awhile whilst he pushed on by a forced march to surprise Birikot the ancient capital of Sohaut. That there completing the conquest of eastern Sohaut he recrossed the Sohaut Sinde before its junction with the Punjgowra, besieged and took Massagorh in the country of the Assazye and Gowr, and not till then crossed the Punjgowra to subdue Bajor. He would then be at leisure to visit Oond and Bajrá (*Oora* and *Bazira*) and

\* It is remarkable that not only in Sahout, but also in the Eusufzye close to Bajrá and Oond (*Bazira* and *Oora*) we have a *Dotala* and a *Kaldurra*, see the map.

after their fall to visit Peshawur, which had meanwhile surrendered to him, and to go through the eastern Eusufzye country bordering the Indus with the Uparchs of that district. And here he prepares for the expedition against Aornos. Arrian writing several hundred years after the event, and without any authentic map of the country might well be perplexed by conflicting authorities (there being, then, several histories of the expedition) and the order in which events followed, may thus have been somewhat confused. Certainly it seems to me that the Choaspes or Easpla are identified beyond doubt in the Qwur Issup or Issup Qwur river of the Issupzye a name still borne by the eastern branch of the Sohaut Sinde. That the Khoes or Khoe or Khoa (for we nowhere have the nominative case) is the river Nagooman appears highly probable. Khoa is probably the Greek rendering of the word Qwur a river.

The account given me by a native of the country, of the site of Massagorh strongly coincides with that of Curtius. He describes it as accessible only from the north and as having on the other three sides a scarping of gigantic precipices, and reports it to have stood a siege of many years. It is now deserted. He however, thinks that there is another Massagorh in Bajor.

With respect to Bajrá and Oond as representing Bazira and Oora, the following arguments appear to me strong. Arrian distinctly says\* that the Baziroi fled for refuge to Aornos.

Curtius after relating the capture of Oora says,† “many obscure towns deserted of their inhabitants came into the king’s power, whose armed citizens occupied a rock called Aornos.” It would be inferred from the passage that Aornos was not far from Oora.

Now that Aornos was near the river Indus, appears from the following testimony. Arrian makes Alexander pass through the district bordering the Indus in going against Aornos.

\* *Και ταυτα οι εν τοις Βαζιροις ως εμαθον απογοντες τα σφετερα πραγματα, αμφι μεσας νυκτας την πολιν εκλειπουσιν, εφυγον δ’ες την πετραν, ως δε και οι αλλοι βαρβαροι επραττον. Απολιποντες γαρ τας πολεις συμπαντες, εφευγον ες την πετραν εν τη χωρα την Αορνον καλουμενην. Ar. Lib. 4, ch. 28.*

† *Multa ignobilia oppida deserta a suis venere in regis potestatem: quorum incolæ armati petram, Aornon nomine, occupaverunt. Curtius.*



Curtius says of it,\* “Its roots the Indus enters scarped on either side with rugged cliffs” and again† “Wretched was the fate of many whom the river sucked down as they fell from the broken rocks.”

Strabo says of it “When Alexander‡ had taken in the first assault a certain rock called Aornos, whose roots the Indus not far from its springs, washes.”

This authority having the greater weight in being all the record of the position of Aornos left by ancient writers.

We therefore require that Bazira at least, if not Oora, and Oora probably, should be near the Indus. The Oora in Sohaut and the Beejapoor in Sohaut or Bajore will therefore not answer; and our attention is required to Baja and Oond, formerly Oora, on the Indus.

Baja still exists as a village, but the ancient site, which was fortified, is now a ruin occupying a small hill about half a mile distant. It stands in a densely inhabited portion of the Issupzye country and the natural refuge of its inhabitants are the mountains Aonj and Mahabunn, both washed by the Indus. Mt. Aonj however is less suited than Mahabunn for such an asylum, because the latter has more water and is farther removed from an enemy occupying the plain. The Issupzye are by far the most gallant race of all the tract passed by Alexander in this expedition Trans-Indus. Bazira stood upon a height.

Oond sometimes written Hoond is still one of the chief towns of the Issupzye. It has still a considerable castle of solid masonry which commands a principal ferry of the Indus. It is separated from the territory of Abisares by the river Indus only, and Arrian tells us that Abisares had sent his agents thither, i. e. to Oora. Several old sites apparently of this town still remain about a mile to the westward of the present fort. They are said to be called still Oora. I think it most probable that this was the Oora mentioned by Alexander’s historians.

\* Radices ejus Indus amnis subit, præaltus utrimque asperis ripis. Curtius Lib. 8, ch. 36.

† Multorum miserabilis fuit casus, quos ex prærupta rupe lapsos amnis præterfluens hausit. Id. Lib. 8, ch. 37.

‡ Αορνον δε τινα πετραν, ης τας ριζας ο Ινδος υπορρει πλησιον των πηγων, Αλεξανδρου κατα μιαν προσβολην ελοντος. Strab. lib. 15, p. 688. a.



There is however, the ruin of a considerable castle and town called Ooria on a hill N. east of Gunduf. The retreat of the inhabitants of either town from an enemy, would be the mountains Aonj and Mahabunn, but Oond has probably been always a place of consequence: whereas the position of Ooria though stronger is less important; and any one acquainted with the Issupzye country would I think go straight to Oond in search of Oora.

I suppose then that Alexander after his visit to Peshawur and after the complete settlement of the Yoosufzye, ascended the right bank of the Indus with his army as high as an army can ascend. This would have brought him to Umb, which is overshadowed on the west by a spur of the Mahabunn called Balimah or the Windy, answering well to Arrian's Embolima, where Alexander left Krateros with half the force to collect supplies. All supplies must have been brought from the Eusufzye, the river beach having little soil, not sufficient for its own population.

A force sitting down at Umb Balimah (Embolima) could have come thither only to attack the Mahabunn or the fort on Mt. Behoh, now belonging to the Hussunzye. Had the operations been directed against Mt. Aonj, a name convertible into Aornos, the force would have halted at Khubl or at Sitana, whence there are paths into Mt. Aonj. From Umb is the ordinary path up to the summit of Mt. Mahabunn.

Mt. Aonj or Wung\* or Bunj is however too remarkable a summit to be passed without notice. It stands between the Indus and the southern end of the ridge of Mahabunn. Its height above the stream of the Indus may be about 3000 ft. The acclivity is always very steep, led horses cannot ascend it. The mountain is generally naked. But the main summit has a few fir trees. This summit shows remains of a few houses or of a small temple, but not of a fort. The mountain has very little water and almost no soil. It is one of the least accessible of mountains to an army. It is the natural refuge of the people of Baja and of that part of the Eusufzye. When Nadir Shah carried his army up to the summit of

\* This name belongs also to a tree, which from description I take to be the ilex, or mountain oak.

Mt. Mahabunn, an Akhoond\* learning his intention, had written the following doggrel prophecy and warning to his brethren.

Roonó, charro, punjó  
 Bunj oopur, chur wunjó  
 Chuhlta kullahs n'h shoo,  
 B'h duah humzurh b'h jooz koorm.  
 Cheh oowyhee pa punjo.

Of which the following is a translation :

O brothers, four or five  
 Climb ye up Mt. Wunj  
 Flying shall ye not be free (until)  
 With my prayers will I create a lion  
 Who shall slay with his paws.

The main summit of Mt. Wunj retreats from the river. A high naked ridge intervenes of which the base borders the Indus. Upon this ridge just above Kyah, is the site of an old fort now called, like a thousand others, Kawfur Kot. It must have been nearly inaccessible. It stands upon the naked rock where there is no soil. I should estimate its height above the river at 1700 feet.

But this site will by no means suit Arrian's description of Aornos, and there are particulars in which it differs from the Aornos of Curtius. For instance, a chasm separated the fort or rock from the besiegers, a forest was at hand and with it Alexander filled up the chasm. But here we have neither chasm nor forest. And if by the word eluvies voraginesque we are to read quicksands or morasses as obstacles to the attack of Aornos, we must leave the mountain summit and descend into the bed of the Indus. Tradition is silent concerning this fort or rather site. As before observed, had Alexander come to attack Mt. Aonj† he would have made his camp at

\* This saint bears the title of Huqueem Sahib of Hindoostan, his name is not known. Nadir by ascending the Mahabunn captured all the cattle and many of the families of the Eusufzyes (Aspasioi.)

† It is curious that when my position of Nara was threatened by a Sikh army of 10,000 and a Doorani army of 12,000, both encamped in sight, the people of Khubl and Kyah sent me an earnest invitation to take refuge with them, assuring me they would place me on a hill never violated by Alexander. They meant, I believe, Mt. Aonj.

Khubl Kyah or Sitana, where the paths of ascent commence. In going to Umb he must have returned a march to either of these places in order to attack Mt. Aonj. Alexander, as will be observed in the extracts from Arrian, took with him a small body of cavalry and mounted archers in the attack of Aornos. Now this cavalry could not have ascended Mt. Aonj, and if they should have ascended, would have been utterly useless there. Whereas led horses continually ascend Mt. Mahabunn, at the summit of which is an open plain where cavalry could act with advantage. It is manifest that Alexander was about to ascend a mountain, having a table summit, wherever that mountain might be sited.

Alexander according to Arrian made two short marches from Embolima (which was near Aornos) towards the rock. Having with him his war-engines, his progress up the mountain would naturally be slow. Two natives of the country then offered to show him a point whence he could assail the rock and Ptolemy was sent with a small force to seize this point. Ptolemy evading the enemy arrived at the point and secured himself there by a ditch and a palisade. He then lighted a beacon to inform Alexander of his success.

All this account will answer well for the Mahabunn, which is a mountain table, about five miles in length at summit, scarped on the east by tremendous precipices, from which descends one large spur down upon the Indus between Sitana and Umb. The mountain spur being comparatively easy of ascent, would not probably be contested by the natives who would concentrate their power to oppose the Macedonians as they scaled the precipitous fall of the main summit. The great extent of the mountain, covered as it is with pine forest, would enable Ptolemy under the guidance of natives to gain any distant point of the summit without observation.

The third day the opposition commenced at a very steep ascent of the mountain. Alexander here could make little way, after fighting from daybreak to sunset. And the Indians perceiving this, fell upon Ptolemy's force on the mountain endeavouring to tear up the palisades. They were however repulsed towards evening. Alexander during the night wrote Ptolemy to attack the enemy in rear, whilst he next day should attack them in front. This succeeded and the mountain summit after much fighting was won.



Alexander was now upon a plain with the rock as it is still called before him. He immediately felled the forest, each soldier contributing one hundred young trees to the work, and dug a trench of approach with a parapet, which the first day was advanced about 125 yds. On the third day they reached the rock or fort. It was then that a small body of Macedonians made a dash at a little hill as high as the defences of the enemy and carried and secured it. And Alexander exerted all his energies to bring the trench up into contact with this hill. The enemy in despair sent to ask terms and during the night evacuated the place.

The whole account of Arrian of the rock Aornos is a faithful picture of the mountain Mahabunn. It was the most remarkable feature of the country, as is the Mahabunn. It was the refuge of all the neighbouring tribes. It was covered with forest. It had good soil sufficient for a thousand ploughs, and pure springs of water every where abounded. It was 4,125 feet above the plain and fourteen miles in circuit. It was precipitous on the side of Embolima; yet not so steep but that 220 horse and the war-engines were taken to the summit. The summit was a plain where cavalry could act. It would be difficult to offer a more faithful description of the Mahabunn.\*

Why the historians should all call it the rock Aornos, it is difficult to say. The side on which Alexander scaled the main summit had certainly the character of a rock. But the whole description of Arrian indicates a table mountain.

The fortification itself though styled the rock does not seem to have been very lofty nor formidable. Alexander went at it without scaling ladders the night of its evacuation, and was the first to ascend it. This we learn from the remark that the soldiers drew one another up the rock.

No European in modern days has ascended the Mahabunn. The accounts of natives are so vague, that it is difficult to trust them.

\* The word Mahabunn signifies mighty forest or mighty pool. The mountain certainly is covered with forest excepting at summit. It seems to me possible that the original name may have been Mahabutt the mighty rock, which would account for its being always styled the rock by Greek authors.



It is certain, however, that the Mahabunn has been occupied by castles in two or three places.

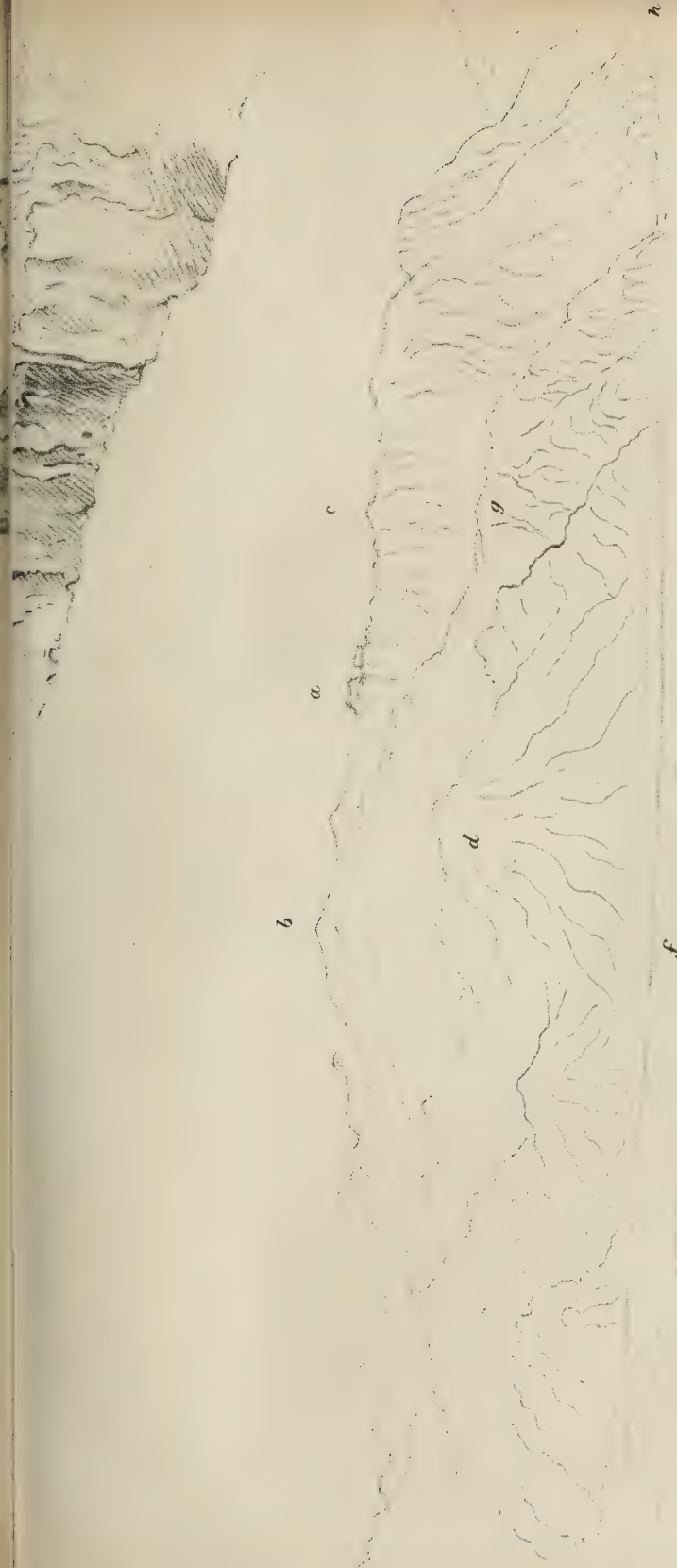
The best known of these is called Shah Kote or the royal castle, a modern name which may refer to the visit of Nadir Shah, who pitched his tent on that spot.

Another castle is said to have stood on the brink of the precipice facing the east.\* The profile is shown in the accompanying outline. To the eastward is a precipice of several hundred feet. To westward is the table of the Mahabunn. To the north is a ravine and beyond it a small hill of the same height as the rock or mound on which the castle stood. The water on which the garrison depended was a spring in this ravine. When the mound was lost the garrison had no choice but of surrender. This site appears to me to answer best the description of Arrian. Ptolemy might easily have passed round to the left, and have occupied the point on the mountain crest. The ordinary path of ascent to the mountain would have placed Alexander also on the left, that is south of the fort. He would have broken ground at 250 yds. that is beyond arrow-flight and have driven his trench up obliquely to the fort. The capture of the small hill near it, would not only have cut off the water of the garrison, but in case of assault, it left them no choice but to fly down the precipice on the east, where every man must have perished in the hot pursuit; whereas when favoured by night, the paths were practicable to mountaineers well acquainted with them.

From Aornos, Alexander went in search of the brother of Assakanos, who had rallied in the mountains and had carried off some of the elephants.

From the summit of the Mahabunn, the extensive valleys of Boonair and Chumla lie spread out to view, the probable retreat of fugitives from Sohaut. When, however, the enemy had mastered the Mahabunn, Boonair and Chumla were no longer tenable. On descending the Mahabunn by the N. or western spurs, Alexander would have found himself in Chumla. The country was utterly deserted of its inhabitants, and Alexander does not seem to have

\* This site, so far as I can ascertain, is now called Aladund or Alatund, see letter A on sketch,



- a. Alatudund Quabonno?
- b. Shathkot
- c. Said to be a Top
- d. Mt. Aonj
- e. Alatudund seen thro'
- f. a Telescope
- g. R. Indus
- h. M<sup>o</sup> Mhowra
- i. Ustera.

Profile of M<sup>ts</sup> Mahabun & Aonj from S. East across the Indus.

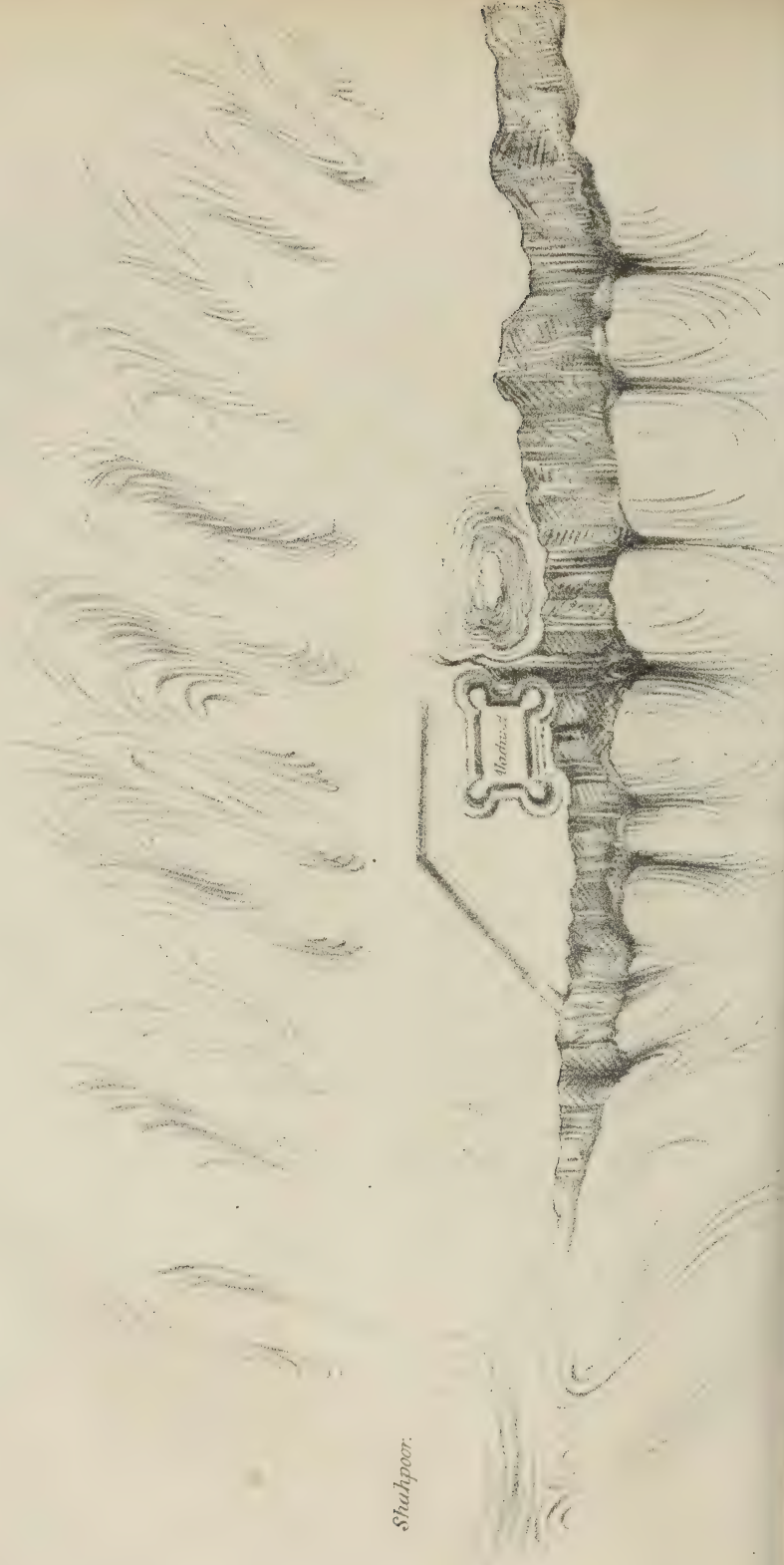






Supposed ground plan of the crest of Mahabim at Aladund.

*Shuhpoor.*



attempted to retain possession of it by inserting garrisons or colonies. He probably thought the valley too remote from support, and too much shut in by the mountains. The principal clan at present inhabiting the valley of Boonair are the Eesak hail. Eesa and Asa are names so semblant in sound, that they would probably be written alike by Greek historians. And when Alexander invaded the dominions of Eesa Khaun, they would naturally suppose some connection between him and Asa Khaun. There is however no improbability in the supposition that the brother of Asa Khaun may have fled to Boonair. The people of Sohaut are Yusufzyes as well as the people of Boonair.

From this fruitless pursuit Alexander returned to the Indus, the army making for him the road in advance. This road was probably the path leading amongst precipices above and along the torrent of the Burrindoo, a river which after watering the valleys of Boonair and Chumla, flows into the Indus above Umb. The path even now is very difficult. This would have brought him back to Umb. There he learnt that the elephants had been left to pasture on the banks of the river. Procuring elephant-hunters, he secured all but two, which fell over cliffs.

This incident is perplexing. It is difficult to understand how the army should have so long occupied the right bank of the Indus, without discovering the presence of the elephants, if those elephants were in any of the islands between Khubl and Atuk, which about fourteen years ago were covered with dense forest,\* since utterly destroyed. It seems to me therefore probable that the elephants had been taken up to the Hussunzye valley above the river Burrindoo and there secreted. For supposing them to have been taken across the river Indus† to Umb. Alexander would scarcely have sent a detachment across that river to capture them, as it would

\* This forest, so far as I can learn, was chiefly of seesoo, mulberry and acacia, and therefore not food for elephants.

† There is no natural pasture for elephants on the Indus, and although there were formerly forests in all its 300 islands, it is not probable that they were either of burgut or of peepul. Those carried away a few years ago were chiefly seesoo, mulberry and acacia, elephants in the Punjaub are fed upon grain and straw, the latter green, when procurable.

have brought him into direct conflict with Abisares under circumstances of great disadvantage.

From this point, according to Arrian, Alexander caused boats to be built and carried down the Indus. At Umb large quantities of drift timber are yearly arrested at an eddy near Durbund. It is also probable that the pine forest then descended lower than at present. Be this however as it may, there were thirteen years ago forests of fine seesoo, mulberry and willow timber along either border and shadowing all the 300 islands of the Indus.

Curtius says that Alexander after the capture of Aornos came to Ekbolimah. This is generally supposed to be the place designated by Arrian as Embolima. But this idea is liable to question, Embolima seems manifestly a compound of the names Umb and Balima, the one in the river valley, the other on the mountain immediately above it. It is a common custom in the Punjaub to distinguish two villages or towns of the same name by affixing the name of some contiguous village, fort or district. Thus Hazara to distinguish it from other Hazaras is still designated Chuch Hazara and another Hazara in the river Chenab is called Tukht Hazara.\* Umb signifies a mangoe tree. The mangoe tree the progenitor of which gave its name to Umb, was carried away by the great flood of the Indus thirteen years ago. Balimah is a Hindee compound signifying the airy or windy. It is generally applied to some elevated spot, but both Umb and Khubbul are remarkable for the airiness of their sites and resorted to by persons in the Eusufzye on that account during the dog-days. Umbalimah would signify Umb the airy, Khubbul Balimah; Khubbul the airy, which would easily fall into Ekbolima. Khubbul was on Alexander's route back from Umb to the Doaba of the Indus and Koopheen throughout which according to Arrian, Alexander now proceeded, making according to Curtius sixteen marches to the crossing of the Indus.

Curtius as has been seen, makes Alexander ascend Mt. Meros previous to his invasion of the Assakanoi. Arrian brings him to Nusa and Mount Meros, in this tour of the Doaba of the Koopheen

\* In like manner the villages Kala and Durra in the Yoosufzye are invariably named as one. Kaldurra possibly the Acadera of Curtius. There is however another Kaldurra eastward of Birikot the capital of Sahout.



and Indus after the capture of Aornos. Both cannot be right. Those who follow Curtius, have endeavoured to discover Nusa near Jullalabad, Capt. Cunningham is of this number. Wilford, I believe, thought he had identified Meros in the Markoh or hill of snakes standing northward of Bussawul. The remains of caverns at the foot of this mountain he supposed to indicate the site of Nusa. Wilford had not visited the spot. Masson who visited it takes a very different view.\*

The objection to any site for Nusa in the valley of the Cabul river below or about Julalabad is, that Curtius, our only authority for enquiring in that neighbourhood, describes Nusa as hidden by dense groves, in which were tombs of ancient cedar, and that the cedar will not grow in this heated valley, where the hot wind prevails in summer. Curtius also describes the Macedonians who had just surmounted the snowy Caucasus as being there chilled by the excessive and unusual cold of the night air. We should therefore expect to find Nusa sited in an elevated valley, where the cedar, if not a native, can with care be made to grow.

The description however of Curtius has a half fabulous air. The army encamps near enough to a large city to hear the bark of a dog. Yet is utterly ignorant of the proximity, and the citizens are equally ignorant of the presence of a large army and its battering Train. For Father Bacchus who delights in disguise has spell-bound the senses of both parties. The bark of a dog first informs the Macedonians that their camp is close to the walls. Arrian's description has much more the appearance of fact.

On the left bank of the Sohaut Sinde just previous to its junction with the Cabul river, is the village Nisutta, standing in the plain

\* "In the distance is a lofty hill on the opposite bank of the river; from Bussawul are seen the caves with triangular shaped entrances, noted by Wilford, and which partly induced him, probably with the vicinity of the Markoh which he supposes to be Mount Meru, to locate the ancient city of Nusa in this neighbourhood. On this point we may not decide. Caves are too numerous and too universally found, that any important deduction could be drawn from so comparatively trifling a group as is here presented. And whether Markoh may have any more serious etymological signification, than the Snake-hill, as understood by the natives is doubtful. Still Bussawul exhibits ample vestiges as does the entire neighbourhood of its ancient inhabitants. The spot is called Chakanor." Masson's Travels.



distant from all hills. Extensive ruins connect Nisutta with Dehri a village now four miles apart from it. Nusa was probably not only a town but a republic, comprising several towns or villages. It furnished 300 horse to Alexander. Nisutta appears to me too far from the mountains to answer to the description of Nusa.

Upon the eastern border of Bajor is a lofty and remarkable mountain called by the Bajoris Koh i Morh Baba, or Mount of Father Mohr, which might very possibly be a corruption of Meros or Meroo. It is covered with cedar and other forest trees, including wild fruit trees, has a shrine at the base, and is regarded by the people as a kind of Parnassus, tenanted by the Boozoorg or spirits of the departed.

It is the place of refuge in times of invasion to the Bajoris. The shrine is said to be a mere tumulus of earth shadowed with trees.

Now it is a remarkable fact that many of the most venerated of the Mahomedan shrines in this tract are old Hindi Teeruts or shrines which have retained their hold upon the veneration of the people in spite of a change of faith. Thus all the Punjpirs\* so common near the Indus are spots, sacred in Hindi lore to the five Pandoo brothers, Yoodhistira, Bheema, Urjoona, Nukoola and Saho Deva. It is therefore probable that the hill Meros is to this day an object of veneration to the inhabitants, and that Bacchus has become a Mahomedan saint, although his present votaries have forsworn wine.

The position of the Koh i Morh Baba is between Bajor and the Doaba of Shubqudr as indicated in the sketch map, accompanying. It is therefore westward of the river Koopheen, whereas Arrian's account would lead us to suppose Mt. Meros and Nusa to lie in the Doaba of the Indus and Koopheen. The indications boasted by the people of Nusa as peculiar to their mountain, will no longer serve us as

\* Punjpir or the five saints or worthies. Their names are known to few, and I had some difficulty in ascertaining the designations of the saints who have succeeded the Pandoo brothers.

There are four hills bearing the name Punjpir in this neighbourhood (Hazara) viz. the isolated hill above Zayda in the Yoosufzye. The isolated rock at Hussun Ubdal. The mountain overhanging Atuk eastward; and the highest point of the mountain on which stands the British castle of Dunna in the Dhoond country Hazara.

If we follow Curtius, it will be difficult to avoid identifying Mt. Mohr Baba with Mt. Meros.

guides. The ivy, if indeed it was then confined to Mt. Meros, now abounds in hills and valleys exceeding 4000 feet throughout Huzara. It is remarkable that it is by Hindi lore sacred to Hercules, bearing the name Hur Bail.\* But I do not remember to have met with it in the arid stony plains and naked mountains of Afghanistan. It is a plant rapidly propagated by birds, and it is not absolutely impossible that it may have been introduced by the Bacchic Colonies, as the wild olive seems to have been introduced by the Macedonians.

If we follow the history of Arrian in our search for Nusa and Mt. Meros, we must place ourselves on the right bank of the Indus, and from thence proceed into the Doaba of the Indus and Koopheen. Mr. Williams, in his history, thus happily disposes of the difficulty. Alexander we have seen on returning to the Indus from Aornos, ordered timber to be felled and boats to be constructed.† On which Mr. Williams observes: "It was as the fleet was falling down the Indus that he visited Nysa."‡ Now the building of a fleet from timber, great part of which had to be felled, squared and sawn, could not have been the work of a day or of a week, and Alexander would scarcely have waited on the spot a couple of months, in order to drop down a river along the border of which he could march in three days with his army. It seems to have been his purpose in perambulating the Eusufzye to enable the workmen to prepare a sufficient number of ferry boats for the passage of his army. We cannot therefore from any passage in Arrian positively insist upon finding Nusa on the bank of the Indus, although such a site might not be improbable.

The most remarkable sites on the right bank of the Indus below

\* i. e. the creeper of Hur or Hurri.

† From the following passage in Plutarch we learn that Nusa was washed by a deep yet fordable stream. "When he sat down before Nysa the Macedonians made some difficulty of advancing to the attack on account of the depth of the river which washed its walls, until Alexander said 'What a wretch am I that I did not learn to swim,' and was going to ford it with a shield in his hand. After the first assault ambassadors came offering to capitulate." See Life of Alexander. Langhorne's Translation.

‡ Mr. Williams seems to have adopted Rooke's reading of the passage which certainly differs essentially from the text of the most esteemed edition of Arrian.

Umb are 1st Ushra, at present a large village standing in a spot of great strength at the southern end of a rocky height, about 300 feet in altitude and protected by the little castle of Kotla\* overhead. The village has little land, and it is difficult to suppose it ever to have been a considerable town, owing to the great difficulty of procuring food in a spot so confined and so remote from the plains. The name Ushra has no resemblance to Nusa. Yet the mountain immediately overhanging Ushra on the S. West is called Mhowra, being a gigantic spur from the mountain Mahabunn. This mountain Mhowra, may have an elevation of 2,000 feet above the waters of the Indus. When Nadir Shah invaded the Mahabunn his attention was attracted by the sound of a spinning-wheel on Mt. Mhowra, whither a large number of the people had fled for refuge. He sent up a detachment and destroyed the fugitives.

About four miles below Umb, stand the two villages of Sitana and the village Mundi.

They are small villages, but Mundi has been the site of a yearly fair which has fallen into disuse in the present day. Above them are, on the north a spur of the Mahabunn, on the west the lower or eastern process of the mountain Aonj or Wunj.

Below these villages come successively upper Kyah, lower Kyah and Khubl, all of which form a little commonwealth of 5 or 6,000 souls. Khubl so-called it is supposed from the abundance of Dhoob

\* The castle of Kotla is very ancient, being built according to Sanskrit history by Raja                      and called by him Urniya or the unapproachable, or virgin fort. Urniya was very possibly the true name of Aornos, and there are some particulars in which Kotla or Urniya will answer to Curtius' description of Aornos, better than any other fort on the right bank of the Indus. For on the side of the Indus it has a sheer precipice of about 250 feet, from the bank of which assailants might be hurled into the Indus. It has also on the north, a small break or a chasm between the site and the rest of the hill, which, supposing the works to have extended so far, must have been filled ere the fort could be attacked. And although the castle is at present a place of little strength, there is abundant evidence that the works have been far stronger and more extensive. On the other hand, no one would readily believe that either Hercules or Alexander would have thought much of the capture of Kotla, and if Kotla could be supposed to be Aornos, Arrian's narrative, which is circumstantial and apparently trustworthy, must be wholly rejected.



or Tuft grass there produced, and called in this country Khubl, is by far the most remarkable village on the right bank of the Indus. It consists of several separate inhabited areas. One a rock, which on the rise of the Indus, is isolated, and the others on a slight elevation at the foot of mount Wunj. Nearer to the mountain is the site of an older village now called Ghazikot, from which are turned up Scytho Greek coins of the age of Mauas. I can, however, discover no mountain in that neighbourhood, answering either in character or in name to Mt. Meros. The people of Khubl are Eusufzyes, of the Ootmaunzye branch of the Mundur division. They form a little commonwealth, well answering the description of the Nusatians. The people westward of them are Juddoons or Guddoons, or Guddana: at Umb on the north are at present Tunhawulies; and the Indus without boat is on their east. They are thus peninsulated, and have often difficulty in holding their own. Their superior courage alone has saved them.

About three miles below Khubl is the village Nochi, the only site that in name resembles Nusa. It is at present a small village at the mouth of a ravine descending from Mt. Wunj. Behind it is the site of the old town which might have contained 1,000 houses. In the ravine is the shrine of the Saint Hajji Rehman Baba. He who sits all day at this shrine becomes bullet-proof. The spurs of Mt. Wunj rising above Nochi are called Srikot, Pathan Rohr, Koonda, Kapooreôn da Gut, Kawfur Lurri, and Jubbi. None of these bears any resemblance either in character or name to Mt. Meros. If Nochi be Nusa, then Mt. Wunj is Mt. Meros. It however does not answer to the description of the historian. It has neither grapevines, nor fruit trees, nor laurels, nor dense groves, nor the wild beasts of all lands. On the contrary, though a sublime and almost inaccessible summit, its character is that of barrenness. Near the crest however, there is a little pine forest, and the ruined walls of five houses are standing there, in one of which was lately found a sledge hammer, so rotten, as to break into powder upon the anvil. Although therefore the name Nochi answers well to Nusa, which in process of time would probably have been thus changed, and although the state of the society of Nochi and Khubl answers well with that of Nusa, yet other particulars are against the identity,



and we must proceed into the Eusufzye in our quest of Nusa. Here the most remarkable town is that of Zayda, standing in the plain of the Eusufzye near the isolated hill bearing the name of Punjpir and venerated alike by Hindoo and Muhummadan : by the former as being the seat of the five Pandoo brothers, after that Yoodisthera had gambled away the throne and empire of Inderprust, the present Delhi. The hill may be about 800 feet in height, but although so noted in traditionary lore, it will not answer to the description of Mt. Meros, being a rock covered with low jungle.

There are some who think Ashtnugr to be the site of Nusa, but I think upon slender grounds. Ashtnugr\* has no mountain to overshadow it, and is manifestly an ancient name.

Punjtar is after Zayda, one of the most remarkable of sites in the Eusufzye. It is a valley surrounded on all sides by mountains, of which the principal is the Mahabunn lying on its north, and separating it from the valley of Chumla and Boonair. I have never been able to discover any traces of Nusa or Mt. Meros in that neighbourhood ; which however I have never visited.

I have, perhaps more than once,† had occasion to allude to the remarkable isolated summit called Elum. It was not until this essay had been almost completed, that I discovered its identity with the Rám Tukht of the Hindoos. This led me to the enquiry whether it might not be the Mt. Meros we are seeking, and there are many points of resemblance.

Rám is no doubt identical with Bacchus. And the throne of Rám is Mt. Meros. Eleleus is one of the names of Bacchus from which Elum may be derived.

Mt. Elum is one of two pre-eminent and isolated summits standing upon the boundary of Sohaut with Boonair. The twin summit

\* Ashtnugr is in Sanskrit history called Eeshnugr. Eesh being one of the names of Shiv'h, who in some respects resembles Bacchus, being addicted to intoxicating drugs, having the tiger's skin, and worship being offered to his genitals. If the Koh i Mohr Baba be Mt. Meros, probably no site will answer so well for Nusa as Ashtnugr or Nicetta. But there seems to me too great an interval between mountain and city, which moreover belong to separate districts and commonwealths—an unfordable river intervening.

† In other papers.

is Mt. Doserra, or the two-peaked. The mountains are so well matched in height, as to leave it matter of doubt which has the pre-eminence. Each has its own advocates, and blood feuds sometimes arise from the question; the Guddazyes swearing by Mt. Elum, the Punjpye by Doserra. One of the names of Bacchus was (*Βουκερως*) the Bull-horned. Another, Bimater or the two-mothered. Both might refer to the double mountain, each peak of which has its votaries. The rivalry regarding the mountains, may very possibly have arisen from the claim of either to be the birth-place of the god Rám or Bacchus.

In addition to the shrine at the summit of Mt. Elum, there are two others at the roots of the mountain in Boonair, the one called the shrine of the Pir Baba, or the sainted father, the other the shrine of Baba Dewana, or the mad father. They are frequented by both Hindoos and Moosulmauns.

The Muhummadans when they want rain, fire matchlocks at the shrine of Baba Dewana, to compel him to give it them.

The Hindoos visit the throne of Rám in the spring and in the autumn, with shouts and wild gestures. There is no wine in Boonair.

The grape grows at a few shrines and villages, but is not of a fine kind.

The soil of Boonair is red.

The river Burrendoo called also the Rám Tukht River, flows down the valley, in length about forty-five miles. It is generally about knee-deep, but when the snow is melting, fordable only at particular points.

Bacchus received his name of Bromios, from Bremmo to groan or murmur. The valley is called Boonnair, says tradition, from Boonn who first peopled it. Boonnair may be a corruption of Broomair, and Berendoo may be derived from *βρεμω* to murmur (the murmur-er). It has a bed of pebbles.

On this river are situated Elye, a town of 1,500 houses, on left bank of the river about two miles from Lyeia inhabited by Harharzyes or Munsoors and Salars.

Two miles from left bank of river Burrindoo is the old site of a town called in Boonair Lussa, in Sohaut Loosa and Lusa, quasi

Nusa. It is now almost deserted ; but may formerly have had 800 houses and a fort of stone and mortar. The site is a natural terrace, ascended by steps of stone. It is one march above the bifurcation of the Berrindoo.

Lyeah, two miles westward of the right bank of the Berrindoo. It is now deserted, but was formerly a town of about 1,500 houses with a fort of masonry. This site is at the roots of Mt. Doserra ; Lyeah, I need scarcely observe, was one of the prominent names of Bacchus.

About three and a half miles westward of Elye is the site of a village now nearly deserted, called Awaun ; quasi, Evan, one of Bacchus' names. The name of Awaun is common in the N. Western parts of the Punjaub, to many villages the property of members of the Awaun\* tribe. But this village belongs to the Tariki tribe, and has only two or three houses of Awauns. It may therefore possibly be a corruption of the name Evan.

In most villages and towns of Boonair, but not in Sohaut, are a few houses of a race called Nusa, who are not Pathans and will not give a daughter to a Pathan (generally the highest race in those parts) although they are Moosulmans. They intermarry only with another race called Baboo Lee who are not Pathans.

The Boa Constrictor abounds in Mt. Elum.

The Satyr or Ourang Outang is confidently asserted to be found in the forest of Mt. Elum. A horrible story is told of a male which carried a woman to the summit of the mountain and was afterwards shot in her company by a wood-cutter.

\* The origin of the Awaun tribe is a matter of some interest. Next to the Gukkurs and the Tchibbs (Sibi) the Awauns are the most manly and the finest race in the Sind Sagur Doaba. They call themselves Arabs, desirous like all Muhammadans to deduce their origin from one of three noble stocks, the Pathan, the Arab or Mogul. This origin, however, is disputed and seems very liable to question. They are remarkable for the strength and sturdiness of their frames, which are very different from the spare, athletic, thin flanked figures and spiritual countenances of the Arab race. The Tchibbs, Sibi, with little doubt are descendants of the army of Hercules. The Awanns may prove to have derived their name from Evan or Bacchus, and to be descendants of the colonies left by that prince upon the Indus. They are most numerous in a district bordering the Indus near Ghayb and called Awaunkari.



The existence of this animal in those parts is mentioned by Greek authors; and a belief prevails in Hazara, that it has been seen on Mt. Gundguruh, where certainly no one would expect to find it. It is called the wild man and supposed by natives to be human.

The wild animals common to lofty mountains of that region are found on Mt. Elum. Tigers and leopards are less numerous than bears. The Boa-constrictor is said never to injure the human species, but to live chiefly upon wild goats, deer, &c. It is probably, I think, the species known to us in India as the rock snake. Of no great length but of disproportionate thickness.

From the above facts, Mt. Elum would appear to offer as favourable a clue as has as yet been found, to the Mt. Meros ascended by Alexander. According to Arrian, Alexander after the siege of Aornos came to the Indus and from thence proceeded throughout the Doaba of the Indus and the river Koopheen, and in this tour came to Nusa, there learnt the position of Mt. Meros and ascended it. The river Indus was at that time swollen by the melting of the snows. The ordinary number of ferry boats would have required many weeks to waft across his army with all its baggage and war-engines, it was obviously better to await the building of fresh boats than to attempt the crossing at once. The tracts conquered were of vast importance, containing the most warlike people he had as yet encountered; and upon the most formidable of all the rivers he was leaving behind him. A tour therefore through this newly subdued country was of considerable utility, and the time spent upon it, was well employed.

Mt. Elum stands as Meros is described by Arrian in the Doaba of the Indus and Koopheen. I can learn of no old site in Sohaut answering to Nusa, and Sohaut having already been conquered, we should not expect to find Nusa there, because according to Arrian the Mulliks of Nusa waited upon Alexander, imploring him to spare their city: and according to Curtius and Plutarch, he attacked and took the city. His former visit to Chumlaif, as I suppose he had visited it after the capture of Aornos, was very hurried; and he may not have penetrated into Boonair, not knowing its history and thinking it too much cut off by mountains to be colonized. It is therefore not impossible that Nusa may have been in Boonair. He



left the city free, but took 300 of their cavalry to swell his army and to serve as hostages.

It may here be worth while to recapitulate all the evidence left by ancient history relating to Nusa and Mt. Meros.

Pliny says, "Other writers are of opinion that the utmost frontier and limit of India is the river Cophetes, and both it and all those quarters are included within the territories or province of the Arii; yea and most of them assume that the cities Nysa as also the mountain Meros consecrated to god Bacchus belong unto India, as parcels thereof. This is that mountain whereof arose the poetical fable, that Bacchus therein was born and issued out of Jupiter his thigh. Likewise they assign and lay to India the country of the Aspagores (Issup and Gowr the inhabitants of Sohaut) so plentiful in vines, laurel and box, and generally of all sorts of apple trees and other fruitful trees that grow within Greece." See Holland's Translation, B. VI. ch. 21.

Strabo says, "After the Koopheen flows the Indus (speaking of Alexander's march). Between those two rivers are the Astakoinoi, Maasianoi, Nusaioi and Ippasioi. Then afterwards the (realm) of Assakanos, where is the city Masoga the palace (seat of authority) of the country. Whence over against the Indus, is the territory of another city Peukela, near which the bridge or ferry was established to waft over his army." Strabo, c. XV. p. 698.

In another place Strabo quotes the following passage from Sophocles.

"Thence beholding the insane Nusa illustrious in the sight of mortals, wherein bull-horned Iakkhos dwelleth, to him the most pleasing of nurses. Where not a bird emitteth sound, et cetera.

"And it is said that he was sown up in a thigh and the poet concerning Lyeurgus Edonus thus saith:

"He formerly caused trouble to the nurses of the mad or maddening Dionusos at the truly divine Nusa."

Here we see Nusa styled the mad or maddening, and Bacchus receiving the same attribute, agreeing well with the shrine at the foot of Mt. Elum consecrated to the Baba Dewana, or mad father.

Let us sum up the features to be sought for in Nusa and Mt. Meros, and then see how far they will agree with those accompanying Mt. Elum.

Nusa was a city hidden with dense groves, and having tombs of cedar (according to Curtius) in a spot remarkable for the intense chill of the night air in spring. It seems by the same author to have stood in the line of invasion pursued by Alexander. According to Plutarch a river washed its walls, not fordable in the spring. It was a city of such consequence as to be able to afford Alexander 300 horsemen, (see Arrian,) Nusa stood in the Doaba of the Indus and Koopheen according to Arrian.

Mt. Meros was in the neighbourhood, Curtius says that Nusa was under the roots of Meros. Meros was remarkable for groves containing the laurel, ivy, vine, and various fruit trees, and which sheltered the wild beasts of all lands. These shrubs the Nusians boasted were produced only in their mountain, and the Greeks appear not to have met with them in a wild state, in Asia, previously. The mountain was so lofty, that birds did not inhabit it, at least the voice of bird was never heard there. Persons entering the grove were or feigned to be seized with Bacchanallian transports and shouted the names of the presiding deity. E vohe, Iacche, Eleleu: Ues, Attes, Saboi. The mountain was dedicated to the deity, whose commonest epithet was "the insane" so that even the mountain was called the mad Meros.

Rám Tukht, the throne of Rám or Osiris or Bacchus, called by Muhammedans Mt. Elum, is, excepting the Mahabunn, the most remarkable mountain in the Doaba of the Indus and Koopheen. It is pre-eminent, rises like some mighty Pagoda to the height of 9 or 10,000 feet, and is an object of adoration to the Hindu and of reverence to the Muhammadan. It is densely covered with forest, full of wild beasts and is of a height at which, in that part of India, the ivy, box, &c. flourish. At its root is the shrine of the mad father. Both epithets of Bacchus, and below it at the roots are the following old towns\* all derivable from the names of Bacchus. Lusa (quasi Nusa from Dionusos), Lyœah (from Luaios), Elye, from the same or possibly from Elios (the sun), Osiris being worshipped as the sun. Awán quasi Eván, Bimeetee quasi Bimeter, a name of

\* I could wish for better authority than I possess for the names of some of these towns. It was only as I quitted Hazara, that I discovered the identity of Mt. Elum with the Rám Tukht.

Bacchus, Bókra quasi Boukera, and Kerauna quasi Keraunos, a son of Bacchus.

Beneath the town of Lusa flows the river Burrendoo, quasi from *βρεμω*, which is occasionally unfordable during the spring. On the other hand the name Meros if it ever existed, as applied to this mountain, is lost. The mountain does not appear to be in anywise remarkable for producing fruit trees or the animals of all climes; unless indeed the Macedonians limited their list to birds. For no doubt the blackbird, cuckoo and others which we are apt to deem of Europe, are found at different heights upon the mountain. Neither on the mountain Rám Tukht nor upon any of that Doaba does the wild grape ripen. But the wild vine is common. This difficulty however is removed by the following passage from Strabo. "From these (Bacchus and Hercules) a certain people were called Nusaioi, and a city of theirs Nusa the foundation of Bacchus, and a mountain overhanging the city Meros, imputing to them the ivy and the vine (growing) there, but it produces not fruit, for the cluster perishes before it grows colored (ripens) on account of the rain falling on it."

I had hoped to have presented this essay in a much more complete form, but incessant duty prevented me from quitting my post in Hazara even for a day, and my departure has put a stop to farther investigation. Between Hazara, Sohaut and Boonair there is absolutely no intercourse. But could I have visited the western Eusufzye country for even a few days, I might have corrected errors and have obtained far more valuable information of countries unexplored by Europeans since Alexander's visit to them. I hope however, that I have here laid the basis of an enquiry which more fortunate investigators may pursue to certainty.

The main point in demand is the precise site of Massaga. Several travellers have assured me, that they have seen the ruins of a fortified city called Massagorh. But their knowledge of the meaning of charts is so vague, and their answers to questions are given with so little consideration, that it is impossible to feel satisfied of the accuracy of our interpretation of their meaning. If Massaga were in Bajor then Alexander's route according to Arrian is pretty well defined. After conquering Eastern Sohaut, he would have crossed the



Sohaut Sinde (Suastus) above its junction with the Punjgowra, have conquered western Sohaut and have crossed the Punjgowra to besiege Massaga. But Massaga seems to have been a city of the Assakanoi and Gouraioi, and their habitat is north of the Punjgowra river, a little territory only of the Gowr tribe being on the right bank of that river. I therefore still incline to the opinion I have expressed that neither Arrian nor Curtius has recorded the events in the exact order of succession, although I think that Arrian's route is generally to be depended upon.

The construction of a map of Sohaut is a matter of much importance. Sooner or later the Sohauties will compel us to punish them. Every possible means should therefore be applied to add to our knowledge of the features of that rich and extensive valley, and imperfect as is the sketch map now offered, it will yet I trust serve as a foundation for more satisfactory charts, and if so, the toil it has cost me, will be well rewarded.

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*Appendix to the Gradus ad Aornon.*

The following are sites which, with reference to the narrative of Curtius, should not be passed unobserved.

Curtius states that the Macedonians in storming Aornos, were hurled from the mountain crest into the river Indus.

There are but two rocks upon the Indus from which this could have occurred, viz. Pehoor and Kotla.\* The latter I have described in a note.

Pehoor is a fortified rock about 100 feet in height and perhaps 200 yards in length by 50 in breadth at base. On the north the east and the west it is a cliff, on the south the ascent is by terraces. The summit has a castle now in ruins of very great strength to resist the attack of a force, unprovided with artillery. At the rise of the river, the rock becomes an island. It commands one of the principal ferries of the Indus and the main road from the Eusufzye to Umb, and other villages on the right border of the Indus.

\* The castle of Raja Hodi on the summit of a steep and pointed hill on right bank of Indus has been supposed to represent Aornos. It might possibly suit the description of Curtius, (quicksands excepted), but would not answer to Arrian's description, having neither water nor arable land.



Curtius says of Aornos “*ab altera parte voragine eluviesque præruptæ sunt ; nec alia expugnandi patebat via quam ut replerentur.*” If we are to read either or both of the words *voragine* and *eluvies* as signifying swamps or quicksands, it will be difficult to match the Aornos of Curtius with any site excepting Pehoor. At the season of Alexander’s invasion, when the snows of the mountains were melting, Pehoor must have been isolated by the Indus, which is remarkable for its quicksands.

Curtius had just before described the rock thus “*in metæ maxime modum erecta est : cujus ima spatiosiora sunt, altiora in arctius coeunt, summa in acutum cacumen exsurgunt. Radices ejus Indus amnis subit : præaltus utrimque asperis ripis.*” Viewed from the north, Pehoor has exactly the figure of the Roman goal. The Indus washes its roots on all sides, and the banks of the Indus on either side are still lined with rocky heights.

The ancient site of Baja (Bazira) also is close at hand. And the site of an Oora lies about seven miles to the south near Hoond. The old site of Moosagurhi lies also about seventeen miles to the north-west, and in the same direction are two villages called Tootali (quasi Daedala) inhabited by the Koodoo Khail, and at the distance of about six miles to the south-west are the villages Kál-Durra (quasi Acadera) which are always named together. Pehoor must have been early fortified, being marked out by nature as the site for a castle. A few of the inhabitants of Baja and its neighbourhood might well take refuge in a site so impregnable to armies previous to the invention of cannon.

But on the other hand, Arrian makes no mention of the Indus as washing Aornos. His description of the site is that of an enormous mountain abounding in springs and arable land and forests. If Curtius is to be followed, Arrian must be rejected in toto, as a fabler. Yet his minute and natural description of Alexander’s Anabasis of Aornos ; of the gradual ascent of a mountain growing steeper as he advanced ; of his battle on the mountain-brow, when with such difficulty he forced his onward way ; of Ptolemy’s cooperation with him by attacking the enemy from the rear ; of his mastery of the mountain summit and regular approaches to the rock :—all these have an air of truth which it is

difficult to resist, and differ essentially from the poetic descriptions of Curtius. Proud as Arrian was of the exploits of a Grecian hero, there is no attempt to exhibit supernatural difficulties. Alexander attacks and carries a strong mountain as a master of the art of war should carry it. He loses men, but they are not hurled from the mountain summit into the swollen torrent of the Indus. The mountain is large and steep, but, so far from being shaped like a cone, 220 horse are led up it and all his war-engines.

The description of Curtius is exactly such, as a man might sit down and imagine to himself as worthy of a rock which had resisted Hercules. And probably in addition to the history of Ptolemy, there may have existed in the time of Curtius many half fabulous narrations of the exploits of the Macedonian hero, which so great a lover of the marvellous as Curtius would prefer to the matter-of-fact statements of Ptolemy, supposing that he could read the Greek of that author.

All the sites described as being near Pehoor, viz. Baja (quasi Bazira), Owra (quasi Oora), Kal-durra (quasi Acadera), are applicable to the site of Mahabunn which is the natural refuge of the people of those old towns.

It has been observed that a camp established at Umb, could have been designed for the attack of no other than Mount Mahabunn or Mt. Behoh. A brief description of the latter may therefore be acceptable.

Mt. Behoh is a peak elevated about 10,000 feet above the sea, occupying the right border of the Indus about twenty miles above Mt. Mahabunn. It forms the Eastern wall of the valley of Boonair, the waters of which, united with those of the Chumla valley under the name of Burrindoo, find passage into the Indus through a cleft of the mountain, south of Mt. Behoh and north of the Mahabunn. I am not aware that the peak of this mountain holds the site of any old castle. But the long high ridge which juts from it to the S. west and which walls the Indus to the height of about 7000 ft. above the sea, is crowned by a remarkable castle of the Hussunzyes called also Behoh. The Hindi name of the Burrindoo river is Wahadri or Ram Tukht ke Nuddie, the latter because it rises in Mt. Elum called also Ram Tukht. The castle of Behoh is certainly

very difficult of access. But it belongs to a district entirely separate and distinct from the Eusufzye where are sited Baja, Kal-durra, Oora, &c. and almost equally distinct and distant from Beejapoor, Owra and Masagorh in western Sohaut. The first march of Alexander's army to attack Mt. Behoh would have brought him to the bank of the Burrindoo. The transit of this stream near the Indus, which must have been performed on rafts of inflated hides, would have occupied two days. But in Arrian's very particular itinerary of this expedition, no river is mentioned, nor, supposing the river to have been forgotten, is sufficient time for the passage allowed. Mt. Behoh has no name like that of the Mahabunn as a place of refuge, being too remote from the plains where invaders are to be feared.

*In Sohaut.*

Of forts sited on hills, we have the following in Sohaut :

Woorna easily convertible into Aornos, the ruins of a town westward of Ranikote on a hill about 600 feet high. It has not been a strong place. It has two springs of water.

Nawagye is thus described to me by a man who was long a prisoner in it. It stands upon a mountain about 1500 feet high (two and half hours' ascent) belongs to the Momunds.

Is sited near the declivity of the mountain. But has on the other side a small plain. No river is near it. The mountains approach it on three sides. It is an insignificant place of no strength.

Mayar is a large town on the right bank of the Punjgowra river about seventy miles above Tungi. It stands upon a mountain about 1500 feet high. But very easy of access and covered with soil. It is upon the boundary of Bajore and belongs to a Syud.

Maragowr is between Thanna and Birikot on a woody mountain. It has water. This place is said to have sustained a siege of forty years, and to have been taken owing to a quarrel between the chief and his daughter. It has four bastions of masonry separated the one from the other. Is now a ruin.

Balimung is the ruin of a fort on a high mountain between Shingurdhar and Galigye. On the western side it has a level plain, on the other three sides precipices.



Oolagraon the ruins of a fort between Manihurr and Tindora, standing on a high hill; tolerably strong.

The reader may choose for himself from amongst these the site of Aornos. For my part I should absolutely require a site upon the Indus. It seems to me the only certain clue we have to Aornos, that it was sited on the right bank of the Indus. If Strabo, Curtius, and Arrian were all mistaken as to this point, we have positively no means of identification.

The valley of Sohaut, Boonair and even part of the Eusufzye and of Hazara are classical ground in Hindi lore. The five Pandoo brothers, Yoodishtira, Bheema, Urjoona, Nukoola and Saho Deva, with their common wife the beautiful Diroopdi, came to Punjpir (near Zayda) when Yoodishtira, having gambled away the kingdom of Delhi, was obliged by his compact to retire to the jungles. The kingdom of Raja Viriht was Sohaut. His capital Virikot or Birikot on left bank of Sohaut Sinde. The Pandoos determining to conceal their dignity and take service as menials with Raja Viriht hung up their arms carefully concealed in a spot still called Pandoo Tahn. Peshawur then called Gundhawa was, it will be remembered, the kingdom of Krishna who eventually aided the Pandoos. At Rani da gut is the castle or throne of the beautiful Diroopdi.

Near Birikot is the Summahd or cenotaph of Kirichuk, a monster half Dyte or Titan and half human. He, falling in love with Diroopdi and insulting her, was slain by Bheem Syne the Pandoo.

One koss east of Birikot is the throne of Raja Viriht, still called Raja ke Tukht.

Three koss south of Birikot is Kirichuk ke Shuhr, the city of Kirichuk, and between this and Birikot the city of Kirichuk's brother.

Half a koss north of Birikot is Raja Yoodishtira's palace, still so called.

At Galagye is a statue of Kirichuk.

At eleven koss west from Birikot are two mundeers or temples of the Pandoos. Two koss west of Birikot, a temple of Kirichuk.

Seventeen koss N. W. from Birikot is Dyteahpoor now called Dyt Kulli, built by the Dyte or Titan, St'hool, near it in the hill is a vast cavern, doubtless that mentioned by Arrian and Strabo as the cavern of Prometheus the Titan.



Twenty-seven koss N. W. of Birikot is the city of Monama the Titan with a fort. There, on seven hills, stand remains of seven cities and seven bastions, only one of them now inhabited, called Monama Killie.

Eighty koss N. W. from Birikot, is Kirichuk ke Nugr, five koss in circuit on a lofty hill.

Ninety-six miles N. west of Birikot on a lofty hill is Kahun Dyte ke Shuhr.

Eleven koss from Birikot south is Pandoo Koop and Panch Nud, a city.

At Naograon in the Yoosufzye near Rani da Gut is the stable of Raja Virah.

In the valley of Chilas inhabited by the Durds (Dardoi) is Bheem Shilla or the stone of Bheem, of the origin of which there is the following tradition. The Pandoos were making the Aswamedha or sacrifice of a horse. The horse released in the wilds for a year was encountered by Raja Chundurhas,\* whose duty it was to conquer and lead the horse to the altar. Bheem Syne entered into the horse and said "Why should we strive. Do what I do, and I will own you my superior;" Chundurhas consented. Bheem raised a huge stone from a neighbouring mountain and cast it down in the valley of Chundurhas (Chilas). Chundurhas strove in vain to raise it and there it yet remains. To this day in difficulty men resort to this stone and endeavour to shake it. If it shake, the omen is bad. If it remain firm all is well. It may be conjectured that favourable omens are generally drawn from it.

In addition to these and many other records of the Pandoos, we have the following ancient monuments and sites.

Hodigraon,† the city of that Raja Hodi whose ruined castle crowns the hill confronting Atuk. This city is in Sohaut north of Birikot (see map.)

Beejapoor in Bajor, Raja Mohr Dhuj's city. I cannot ascertain the precise position of this old site, which by one traveller is described as in the Abazye valley. But by Sanskrit books as in Bajore. Mohr Dhuj is said by the latter authorities to have given name to the Koh i Morh Baba or hill of Father Morh.

\* Chundurhas, moon grinner, one who grins like the moon.

† Raja Hodi plays an important part in the traditions of the Punjab.

Kohaut, Raja Juggut's fort.

Trippur, the triple city of Raja Nul, south of Birikot (see map).

Tir Nugr, city of the Raja Tir Bul, north of Birikot about eighty miles.

Maunpoor, city of Raja Maun, four and half miles in circuit from Birikot, 100 m N. west.

Nug and Nugr, cities of Raja Mandatta's Vuzir, 200 miles west of Birikot.

Udli Nugri, city of the said Raja's wife, 240 miles west of Birikot.

Vihung Raja ke Mundur, 50 m N. W. of Birikot, on a hill trans-Sohaut Sinda.

Nutti Nugr, on a lofty hill, 65 m N. W. of Birikot.

Aruktun or water of the sun, an inexhaustible fountain never overflowing. Of Raja Maun's age, 13 miles west of Kahun Nugr.

Jumrood fort in mouth of the Khyber. The place of Raja Juggut.

Kurna, valley of the Kishen Gunga where are the fort and city of Raja Kurn, the gold-maker. His hill is in the Dhoond country.

Rani Kokla's palace, four and half miles of Nowa Shihr Hazara. She was the wife of Raja Russaloo, and being taken in company with her lover was tied by Russaloo to his horse as the balance to the dead body of her lover Raja Hodi and turned adrift. The horse fled from Moorut to the Ghayb country on left bank of Indus below Atuk. There, a Raja of the Chundala or sweeper caste, took her to wife and she became the mother of the Ghayb tribe, one of the most hardy, as soldiers, of all in the Punjaub.

Mt. Moorut, S. west of Rawulpindi, so named from an image of Rani Kokla, which the remorse of Russaloo caused him to set up and which was mutilated a few years ago by the bigotry of a Moolla. It is in a little artificial island at the foot of the hill, close to Russaloo's palace.

Tukht a bun, in Boonair (see map). Fort of Raja Mir Bul.

Bulkot, between Balakot and Gurhi Hubeeb Oolla. Valley of Nynsook river, Hazara. The fort of Raja Bul.

Balakot, same valley, fort of Raja Bala.

Maun Sir now Maunsera, Hazara, fort of Raja Maun, contemporary with Raja Sala Vahana or Salbyne.

*Report on the Dust Whirlwinds of the Punjab. By C. A. GORDON,  
Esq. M. D. Surgeon, to Her Majesty's 10th Foot.*

In endeavouring to furnish a report of the storms, typhoons, cyclones, or whirlwinds that have passed over the station of Wuzzeerabad during the period from January to July 1853, both inclusive, I have considered that the distinctive peculiarities of each will be most profitably discussed, if described at the same time that individual storms are noted; such general conclusions as may present themselves from the premises, which will thus in the course of the following observations be developed, being classified and summed up as a sequel to this paper. And I hope the views I adopt regarding the circular current of wind in and general onward motion or track of these storms or cyclones as witnessed in this part of the plains of India will be deemed justified by the nature of the observations from which they have been deduced.

1.—7th January, 1853. The sky had a threatening appearance all day,—prevailing clouds, rain cloud, with well defined lower border, dark cumuli and strato cumuli, at 5 P. M. the wind was N. W. afterwards became S. W. the body of the storm being to the S. The violence of the wind was inconsiderable, heavy rain fell,—thunder, with lightning both sheet and forked,—the former being deep pink and the latter flame-coloured.

It would appear then

a. That the above storm was nothing more than one of rain such as is of frequent occurrence in these provinces, during the cold season.

b. That the circular motion of the wind was from L. to R. or with the wound of a watch.

2.—23rd Jan. 1853. A slight storm is noted as having occurred at 10 P. M. but no observation in reference to it is made, further than that for several nights prior to its occurrence, a large halo was observed round the moon, interrupted towards the N. and that the storm was followed by weather of great coldness.

3.—3rd Feb. 1853. For four days, there had been an increase of nearly  $10^{\circ}$  in the temperature. On the early morning of this



date, a storm of much rain and wind of considerable violence occurred, but no observation was made till 7 A. M. at which hour the wind was at E., the atmosphere dark and hazy in every direction, clouds, cirri and cirro strati, pointing in no definite direction. The wind continued at E. till 2 P. M. when the storm passed over, and could be distinctly seen proceeding direct N. and occupying about  $\frac{1}{3}$  the circumference of the horizon.

It would appear that in this storm

a. The circular motion of the wind was from L. to R. or with the hands of a watch.

b. That in all probability the storm formed over the station, and did not acquire its progressive motion northward until towards 2 P. M. shortly before it passed away in that direction.

c. That this was also one of the cold weather falls of rain, common in upper India.

4.—11th Feb. 1853. During the morning the sky presented a confused appearance, (I know no better expression to make use of.) It was almost entirely overspread by strati and cirri variously modified. Towards N. W.—N. and N. E.; the streaks of these clouds were irregularly blended and curved,—the curves being in no definite direction.

Shortly after mid-day the wind, which had been blowing moderately from N. E., increased much in violence,—carrying with it clouds of dust. It was unattended by thunder or lightning. It thus continued with temporary variations in intensity till about 5, 30 P. M.

During this time the direction of the wind did not vary, nor did any rain fall until about 5 P. M. and then, only a few drops. In the evening a dark cloud was observed at a great distance resting on the horizon E. and N. E.

It would appear that in this slight storm

a. There was no circular motion of the wind.

5.—7th March, 1853. The sky during the previous day was cloudy and *threatening*. Towards sunset a dense mass of black cloud arose from the horizon and gradually extended over the sky. About 7 P. M. of that day the whole of the firmament was hidden by a veil of cloud; the horizon only being observed clear and bespangled with stars. Lightning was observed S. W. and W. with thunder



in the former direction. A few drops of rain fell at 7.30 (of 6th) the wind at that time being S. W. Towards morning the violence of the thunder increased and a storm of wind and rain was audible. The early part of the 7th was still cloudy, occasional puffs of dust swept past,—and in various directions revolving pillars of sand indicated the presence of whirlwinds of small size at different parts of the surrounding plain.

The wind at 9 A. M. of the 7th was N. by E. and at noon E. by S. having gradually veered to that point by N. E. About 2 P. M. the sky at S. E. was very hazy as if portending rain and wind. A small cyclone soon afterwards made its appearance and passed over our house, taking a direction in its onward course or track of N. E., the wind at the same time blowing from S. E. As the body of the storm advanced from the station, it was seen first to curve gently to W. but in a few minutes appeared to be broken up. The wind during the remainder of the evening continued at S. E. the atmosphere was clear,—and several slight squalls continued to come on at intervals.

This storm appears to be interesting on account of the meteorological appearances that accompanied it. From the position of its body as compared with the wind point, it appears evident that

a. The circular current of air was from L. to R. or with the hands of a watch.

6.—12th March, 1853. Since the occurrence of the storm just described the sky had continued dull and cloudy, presenting all the indications of approaching rain. During the day (of the 12th) there were occasional gusts of wind from various and uncertain directions, at the same time that there was more fine sand floating through the atmosphere than could be well accounted for by the slight breezes that prevailed. It was difficult to say what part of the sky presented the most threatening appearance, and towards evening this increased. About 6, 30 P. M. rain began to fall; the shower coming from about S. W. and about 10 to 11 P. M. rain was falling in torrents.

The greater part of this storm having occurred at night, no notes were taken from which to trace the shifting of the wind.

Imperfect as the description of this storm is and although not

calculated to enlighten us, either as regards the circular motion of the wind or the progressive motion of the meteor, it nevertheless is interesting as exhibiting one phenomenon which will be found to be of not unfrequent occurrence, viz.

*a.* Heavy falls of rain in this part of India are sometimes preceded by a loaded condition of the atmosphere with impalpable dust which could not be accounted for by the amount or force of wind blowing at the time.

7.—13th March, 1853. The sky still continued dark and cloudy. Towards evening very dark clouds arose in the west and W. by N. Much lightning, both sheet and forked, was evident. Towards 8 o'clock the near approach of thunder was audible, but the storm was seen to pass by the station to the N. and E. A slight shower of rain fell.

The above description is also imperfect, but it tends to teach us that,

*a.* Some storms in this country are so partial and well defined in extent, as to render it a matter of no difficulty to trace their course.

8.—25th March, 1853. The following description of the 8th and 9th, storm observed and registered is taken nearly verbatim from notes written at the time.

In reference to No. 8, it is noted that "the day was cloudy, prevailing clouds strati and cumuli. Hot and sultry,—a very gentle breeze was blowing. About 5 P. M. a diffused haze of dust to the N. W. and N. indicated wind in that direction, and shortly afterwards, a slight increase of wind took place from W. by N.

It only lasted a few minutes, and the dust storm such as it was passed N. of the cantonments and speedily broke up.

9.—26th March, 1853. Hot all day, clear and sunshine, a few cumuli and cirri. About 5 P. M. sky in N. W. became dark, and a few columns of dust were seen in different parts of the darkness. The wind at the time was N. W. and W. by N. but not very strong. The body of the storm like the previous one passed N. of cantonments.

NOTE.—Although there are many reasons for presuming that the two last small storms were circular, in which case the motion of

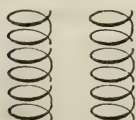
the wind must have from R. to L. it is nevertheless a matter of considerable difficulty to say positively whether they were true cyclones. It certainly may be that the motion of the wind in them was rectilinear, although from the visible bearing of their mass, the direction of the wind is readily accounted for by supposing them to have been circular. It appears to me that in order properly to ascertain the nature of these and similar land storms, it is absolutely necessary that a cordon of observers be established at various stations, for this purpose.

From the above two slight storms, we readily draw the deduction that,

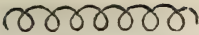
*a.* It is at times difficult, if not impossible, for a single observer to decide whether the motion of the wind in certain storms is rectilinear or circular.

10 and 11.—30th March, 1853. At sunset of 29th, the sky generally was much covered with cumuli and strati, the setting of the sun giving the horizon in the W. a red lurid appearance. The morning of the 30th was hazy; atmosphere close and still, yet a quantity of impalpable dust was suspended in it. About 10 A. M. a sharp breeze occurred from S. and from the darkness to W. and N. at that time, it would appear that the circular motion of the wind was from R. to L. and that the border of the circle only passed over the cantonments. The breeze soon diminished in intensity, but the atmosphere continued hazy, and the temperature was considerably lowered. At 6 P. M. a dark mass of cloud and dust was observed in the N. and N. W. extending to about N. E. It rapidly advanced and then struck our house at N. by E.; varying between this point and N.

It was interesting to observe spiral columns of dust such as are




represented in the margin coming along with and facing part of the body of the storm, the convexity of their course being forward, and the gyrations of the minor currents of wind of which they seemed to be constituted having a direction from L. to R. and extending upwards from the ground into the atmosphere, and with an onward progress such as would be represented by an imaginary horizontal section near the earth, thus

 only more circular than is here represented. At the conclusion of the cyclone, slight rain fell, and as the storm passed away from the station, the atmosphere was left clear, except towards the west, where the body of it was visible, progressing onwards.

From the above description of this storm several points of interest are deducible, namely—

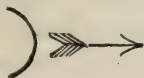
*a.* The body of the storm consisted of a number of revolving spiral columns of dust blown by the wind with a circular motion from L. to R. and at the same time gyrating from the earth upwards.

*b.* The onward motion of the body of the storm was at the station in a general direction from N. E. towards W. but probably with more or less of a curve, or zig zag  which might account for the slight variations in the direction of the wind during the observations.

*c.* The convexity of the minor gyrating columns of dust being always onwards, would indicate that the chief force of the storm was at an inconsiderable height above the surface of the earth.

12.—9<sup>th</sup> April, 1853. Although the gusts of wind and dust which occurred during the day cannot properly be included as “storms,” they nevertheless presented a few peculiarities which render them deserving of notice.

The morning was very hot, and the sun very bright. Shortly after mid-day the atmosphere began to become hazy, especially towards the S.: a close and oppressive sensation was complained of. Small whirlwinds carrying up dust were seen in different parts of the plain on which the station is built, and not only was their circular motion different in different individuals, but their onward progress was in different and independent directions, while again in other parts of the plain a column of dust would be observed suddenly to rise from the ground, without any evident circular motion, but with a slight curve at its lower extremity, the convexity being directed forward, thus,





About 3 P. M. the whole sky became obscured and presented a very peculiar appearance: several perpendicular columns of dust such as that represented above, and varying greatly in diameter, although all of nearly equal height were seen approaching from S. E. their upper extremities blending as it were in a dark cloud apparently containing much aqueous vapor as well as suspended dust. At the same time, a mass of dust was seen advancing from N. E. and several smaller columns such as have been noted, were being driven onwards in various directions in our vicinity.

These various columns seemed to break up, and instead of a cyclone coming on, a moderate breeze set in, carrying with it masses of dust. Occasional peals of thunder were heard in various directions, a few drops of rain fell, and about 8 or 9 P. M. the atmosphere cleared up.

It is to be regretted that no proper instruments were available to observe the peculiar conditions upon which the phenomena just described, depended.

It appears that the two days succeeding that on which the above modification of a storm took place were rainy, the wind cold, the Ther. 70° F. in the shade.

One or two points of great meteorological interest may be gathered from the above remarks, viz.

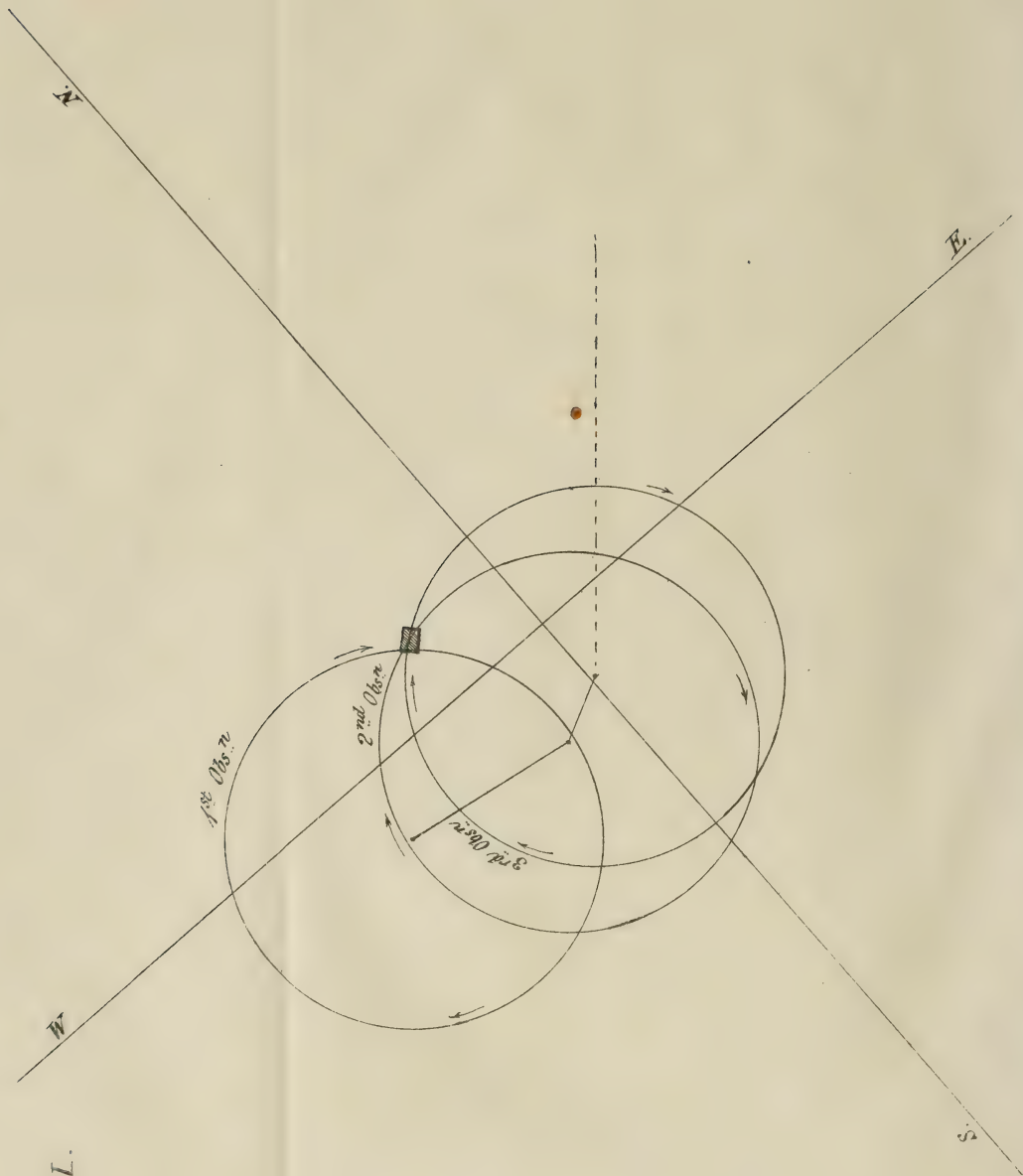
a. Numerous whirlwinds may, under certain circumstances take place simultaneously within a very inconsiderable space; yet with independent motions, both as regards the circular current of wind and onward progress.

b. Currents of wind may be noted at their first commencement in certain cases, by the column of dust they suddenly raise on a dusty plain.

c. These phenomena are attributed to electro-magnetic, or other influences which the want of philosophical instruments renders us unable to detect.

13.—12th April, 1853. Although there were numerous cumuli and strati during the forenoon, the day was nevertheless clear, and the sun at times shone very bright. About 1, 30 P. M. the wind at the time being N. E. a magnificent mass of defined cloud appeared S. W. and soon assumed a distinctly arched form. Films of cloud





were visible in the latter direction, moving in opposite directions, and the lower border of that forming the arch was illuminated by the sunshine. Thunder was loud and increasing, lightning became vivid, especially in W.: streaks, as if of rain falling were observed in various directions extending downwards from the border of the arch just described. Soon after this, the wind struck our house at W. by N. a very severe storm then came on, and hail stones of considerable size fell thickly. The wind soon veered to W. then to W. by S. and in less than half an hour the sun again shone out, the body of the storm was visible progressing N. E. and contracting in its diameter. A splendid rainbow appeared at its nearest border. (Plate XVII.)

The Chart I. 1853, is intended to represent the progress of this storm. The wind seemed to be from L. to R. the diameter probably 8 or 10 miles, and the onward movement of the cyclone very rapid although the want of apparatus rendered it difficult to say at what actual rate it progressed, we may however presume that, its diameter being 10 miles, and the period of its continuance half an hour, it must have moved onwards at a rate equal to 20 miles per hour.

It may be noted that some of the hail stones that fell during the above storm weighed one rupee. The evening, after the cyclone had passed over, was clear, the atmosphere bracing and cool. On the horizon between S. and E. much lightning was visible, the flashes showing towering masses of thunder cloud in that direction, but no thunder was audible.

It may be further observed, that the temperature was moderated for several days after the occurrence of the above storm.

The following are some of the points of interest that the cyclone just described teach.

- a. That the circular motion of the air was L. to R.
- b. That the diameter of the cyclone underwent modification as it progressed.
- c. That the onward course or track of the storm was more or less elliptical, as indicated by the chart.

14.—20th April, 1853. The early part of the day was cloudy, the sky much obscured by various modifications of strati. Shortly after 4 P. M. the appearance of a dense mass of thunder cloud in



N. E. indicated the existence of a storm in that direction. At 4, 30 P. M. the wind struck with considerable violence at N. as noted in Table II. 1853. At 5, 30, it was at N. E. and before 6, the dust had cleared away, but the outline of the storm could be seen extending a little above the horizon at S. W. or S. W. by S.

About 6 $\frac{1}{2}$  P. M. a similar storm approached from the same direction, but was very small and of inconsiderable violence; only lasting a few minutes, when it appeared to break up. At the same time, two other partial clouds of dust were observed, one on either side of, but at a little distance from this, but they also soon broke up.

Although in gusts such as have just been described, it is a matter of difficulty to say on all occasions in what direction the wind moves, whether circular, or in direct lines,—we may nevertheless presume that in the one noted in the chart II. 1853, (Plate XVIII.)

a. The motion of the wind was from R. to L. or that which authors describe all storms in the northern hemisphere to have,—we moreover learn that

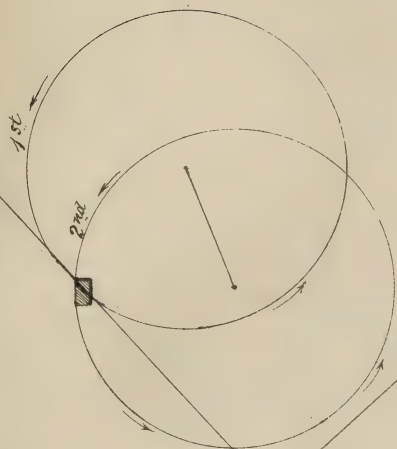
b. Cyclones at times may be seen to break up or expend themselves.

15.—27th April, 1853. The whole forenoon was hazy, the atmosphere so much obscured by dust as to render it impossible to see to a greater distance than 100 to 150 yards. About 1 P. M. the wind became very strong from S. and between that hour and 4 P. M. gradually veered round by W. to N. at which latter point it ceased about 7, gradually varying, however, a few points E. and W. of North.

From the very obscured state of the sky, it was utterly impossible to say positively from what direction the body of the storm came. It appears tolerably evident that it was circular, and on this supposition the chart III. 1853, (Plate XIX.) has been constructed, the course of the wind and cyclone track being noted in the diagram according to both suppositions, namely, 1st that its motion was from R. to L. and 2nd that it was from L. to R.

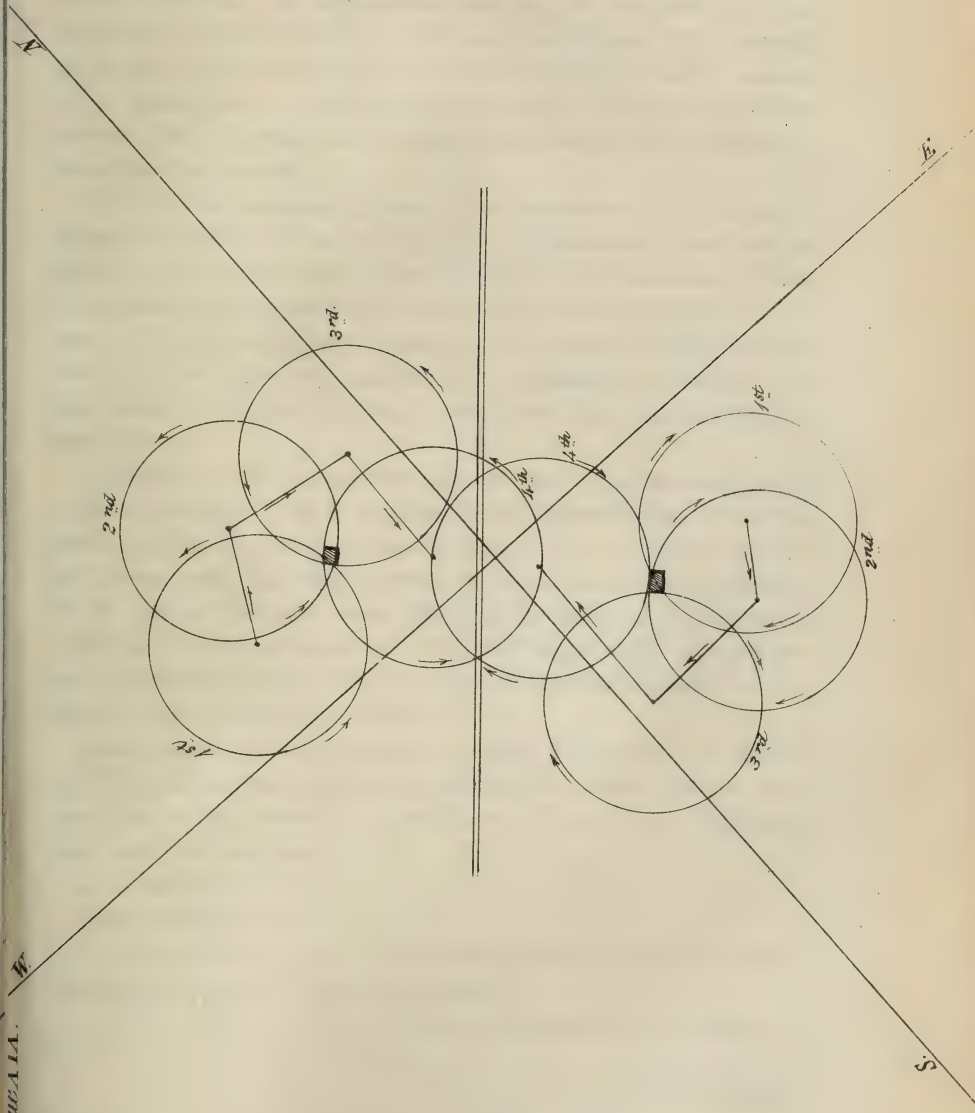
The above storm must therefore be taken as a very striking example of the fact

a. That it is at times impossible for a single observer to say at the time what is the circular course of wind in a cyclone, and therefore, as a matter of course,



|    |                     |                              |              |
|----|---------------------|------------------------------|--------------|
| 1. | 4 $\frac{1}{2}$ P M | 20 <sup>th</sup> April 1853. | Wind N.      |
| 2. | 5 $\frac{1}{2}$ "   | "                            | " " " " N.E. |





1<sup>st</sup> Supposition



2<sup>nd</sup> Supposition







b. Equally impossible to detect the cyclone track.

16.—10th and 11th May, 1853. Since the occurrence of the last storm described, the temperature continued to range in an open verandah to 104° F. and in the house to 84° and 87° F. the sky being clear: on the 8th some cirri were observable in the W. shortly after sunset, and on the 9th in E. at sunrise. These continued to increase (as they always do in this station for some days before a storm of wind or rain).

On the 10th occasional pillars of dust were seen in various directions, but although extending high and perpendicular, they had no circular motion, their only movement being directly onwards. They first became evident about 4, 30 P. M. and continued till sunset; the heat of the air being very oppressive, no breeze blowing at the time. The evening was intensely dark, especially towards the N.; and during the night high winds continued, but no observations were made.

During the morning and forenoon of the 11th, the same high wind continued from N. E. with occasional drops of rain. Towards the afternoon, the wind increased until at sunset it blew a very stiff breeze, bringing with it clouds of dust, and continuing steady N. E. About 7, 30 P. M. sheet lightning in great quantity appeared S. W. and N. W. and about 9 o'clock rain began to fall in torrents and so continued, the wind all the while not lulling until 3 A. M. of 12th, when the weather cleared up.

In the notes of the above storm, taken at the time, it is stated that "I could not see any thing in the above to induce me to suppose that it was other than a parallel wind from N. E.," and it appears really to have been

a. A rectilinear storm.

It also teaches us that,

b. The columns of dust that precede storms may under certain circumstances have no circular movement.

c. They may occur while there is no perceptible movement of the air even in their mere vicinity.

d. Storms during the hot months are often preceded for several days by the appearance of strati in the West at sunset.

*Note.*—It appears that during the whole of the 12th, occasional

gusts of wind from various directions prevailed, and at times with rain. In the evening, the horizon seemed encircled by sheet lightning, and heavy rain fell. The 13th was cool, and the early part of the day clear. About 4 P. M. the whole circumference of the horizon became dark, wind came on from W. by N. but no thunder was audible.

The 14th was characterized by irregular gusts of wind, at times carrying along with them masses of dust, but the evening was clear.

The above notes are entered here as showing the description of weather that generally succeeds for a short time the occurrence of storms.

17.—20th May 1853. Since the occurrence of the last storm, the western horizon has continued to present a cloudy appearance every afternoon at sunset; cirri and strati appearing near the earth in the afternoon, but clearing away again during the early night. At 4, 30 P. M. of 20th a heavy cloud of dust of unequal density was seen approaching from S. W., the dust as it were in pillars, with intermediate spaces of comparative clearness. They had not however that appearance of violent agitations that characterizes most cyclones on land, and the summits of the pillars appeared lost in cumulus-like clouds heavily surcharged with dust. The force of the wind was not very violent, nor did the direction of it vary during the hour the storm lasted. The diameter of the cyclone extended from S. E. to W. a few flashes of forked lightning were visible, and a few peals of thunder were heard. As the storm of wind passed over the station in a N. E. direction rain began to fall in torrents and afterwards continued so during the night.

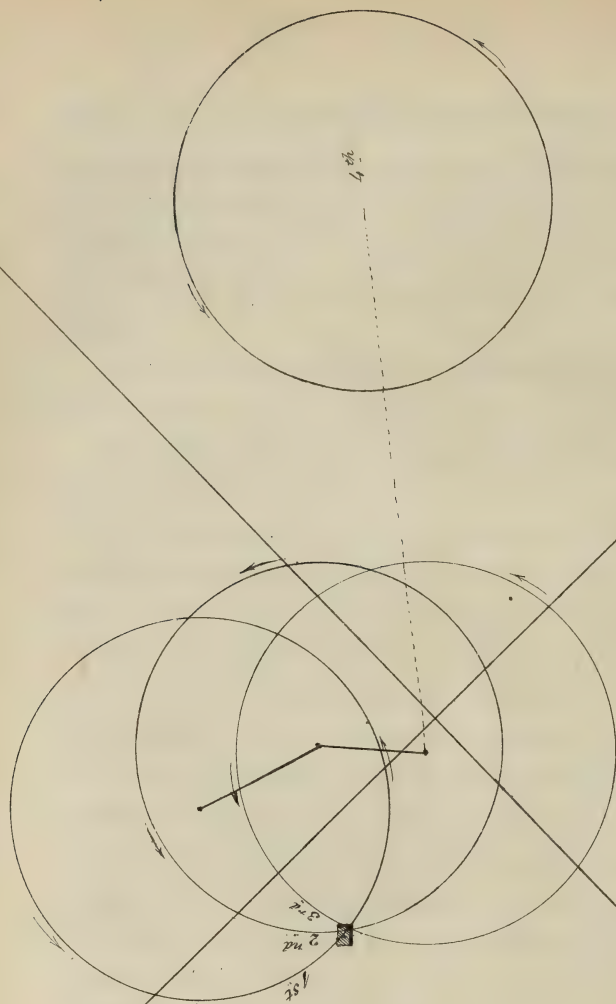
In the notes taken on the spot during the prevalence of the above storm it is stated that "it would seem as if the above cyclone being about to break up, had lost its circular motion\* before reaching the

\* This is of course merely theoretical, yet, it is quite easy to imagine how such a circumstance might take place. If, for instance, the individual spiral currents, whose existence may be said to be definitely ascertained, were, from a disturbance in the balance of the particular agencies on which they depend, to be for a time more under the influence of those that give such meteors their onward course, than those in obedience to which they are made to revolve on their own axes, the latter motion would be retarded by the former, and would soon altogether cease.





Chart IV. Plate XX.  
1853



2nd June 1853. 10. A.M.  
1st Observation. Wind W. by S.  
2nd " " N. W.  
3rd " " N.  
4th Course of Storm N. E.

station, as otherwise it is difficult to imagine how the wind should have continued throughout from one point." At the same time; that it was not a mere parallel current of air from the commencement is presumed from the circumstance of the defined pillars of dust being evident, and unbroken.

By a strange omission, the direction of the wind has been neglected to be stated, but this storm like that previously described teaches that

a. The occurrence of strati in the W. at sunset precedes the occurrence of storms.

18.—2nd June, 1853. See chart IV. 1853. (Plate XX.)

The early morning was very hot, with a nearly cloudless sky. At 9, 30 A. M. thunder was heard in W. and it was then observed that a darkness prevailed there, as if rain were falling. At 10, rain began to fall, with a slight breeze from W. The rain after a short time fell in torrents, and the wind increased so much in violence as to destroy some doors and roofs.

In less than fifteen minutes the storm had passed over, and was seen progressing N. E. as represented in the chart.

The original notes of this storm are very meagre, but an examination of the chart teaches us that

a. The circular motion of the wind was from R. to L. or contrary to the hands of a watch, and this conclusion is arrived at by

And indeed, it may not inappropriately be presumed that many cyclones on a large scale break up in this way,

It is well known that the force of the wind on the curve corresponding with the onward track is much stronger than that on the opposite, or curve of retardation, and that this difference in force is occasioned by the onward progress of the cyclone. When therefore we consider that between the various smaller spirals that go to constitute the "storm" there is this tendency to retardation in their circular motion, and that it is increased considerably by the mere friction of the adjoining current, as well as by the circumstance that the adjoining borders of different spirals are revolving in opposite directions, it seems to me that the very circumstance of two combined motions existing, must tend of itself to sooner or later destroy the force and consequent danger arising from these phenomena, and in fact that the more powerful these influences are, the more rapidly is the breaking up of a storm brought about.

noting the wind point at each of the three observations as indicated in the diagram.

b. That the onward course or track of the storm was zig-zag.

19.—16th June, 1853. On 15th, and this forenoon there was a general haze apparently from impalpable dust. Thermometer in the house ranged to 98° F. At 3, 30 P. M., slight thunder was heard overhead, and a dark cloud of dust was perceptible, occupying the horizon from N. E. to N. W. (about half an hour previous, a whirlwind revolving from R. to L. passed over my house, proceeded in a curvilinear direction first N. and then W. to some adjoining houses with which, in coming in contact, it broke up). The storm was not very violent, the wind first came on from S. W. and in about half an hour was blowing from E. Very heavy rain fell, and the sky first cleared up in N. E. the mass of the storm being chiefly progressing to the W.

From the above storm we learn two points, and which, it may be noted are borne out by other observations, the results of which it is not the object of this paper to discuss, namely,

a. A loaded state of the atmosphere from impalpable dust often proceeds the occurrence of a storm.

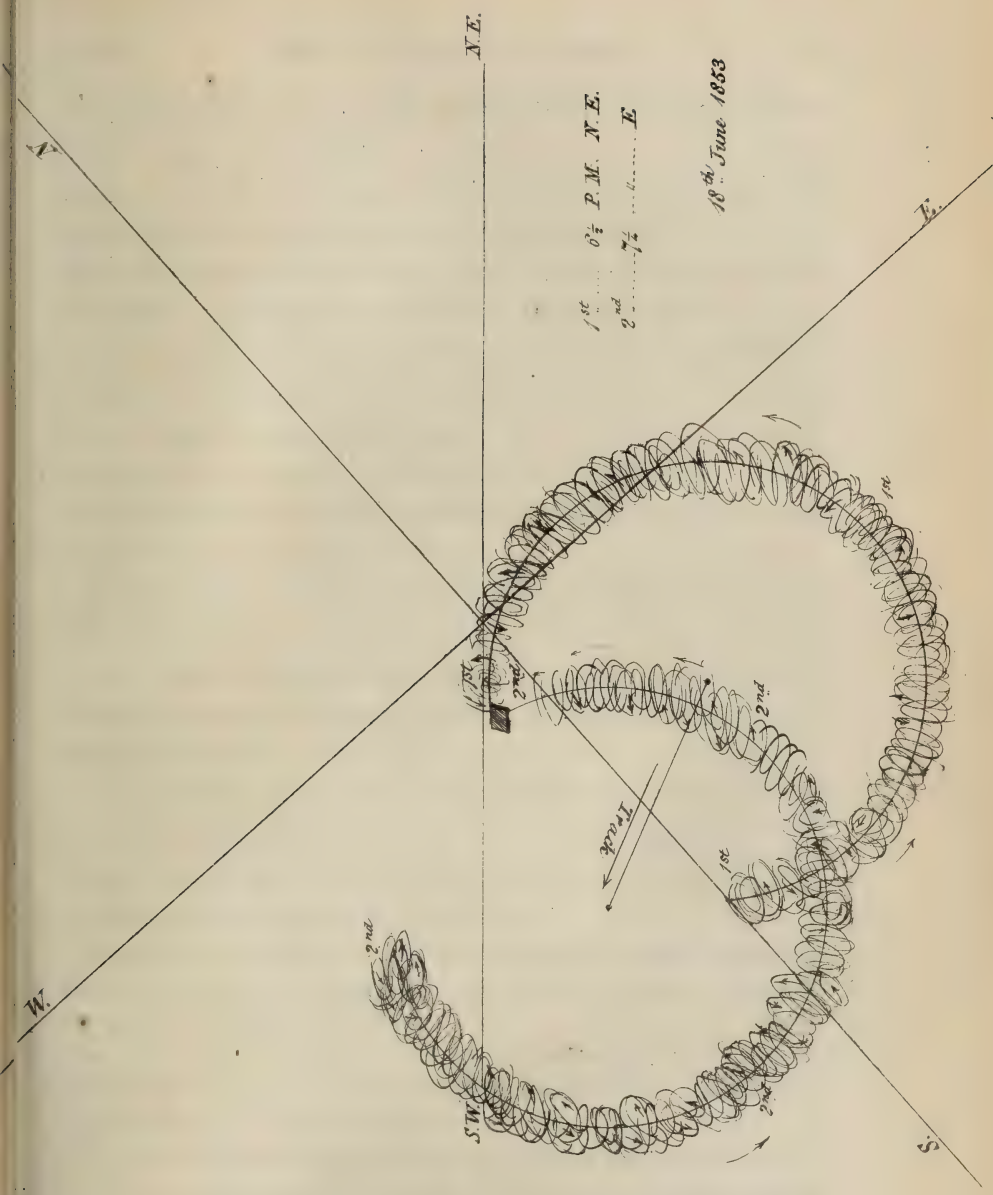
b. A cyclone is sometimes preceded by whirlwinds of greater or larger dimensions.\*

20.—18th June, 1853. According to notes taken at the time I find that the moderation of temperature by which the above storm was followed continued. During the forenoon of the 18th an agreeable breeze continued to blow, but shortly before sunset (it having been S. E.) it ceased, and a bank as if of impalpable sand and cloud appeared on the horizon, extending from N. E. to S. and probably with a diameter of ten miles.

It was evidently concave; the N. E. extremity appearing to be nearer to our house than the S. About  $\frac{1}{2}$  past 6 P. M. the dust came up from N. E. as represented in chart VI. 1853, (Plate XXI.) and at the same time the two extremities were distinctly seen approaching each other as the body of the storm progressed. (This approximation of the extremities is endeavoured to be represented in the segment 2

\* A chart of this storm was prepared during its prevalence, and marked V. 1853, but in consequence of its inaccuracy, I have omitted it here. C. A. G.

1 mile & 1 mile. A.S.T.  
1853.



1<sup>st</sup> ... 6<sup>3</sup>/<sub>4</sub> P.M. N.E.  
2<sup>nd</sup> ... 7<sup>1</sup>/<sub>4</sub> ... E

18<sup>th</sup> June 1853





the extremities of which, it will be observed approximate much more closely than those of fig. 1).

My private notes go on to say,—“ It appeared therefore that the storm was only commencing its course at this station, that the minor currents whose motion was circular, as shown in the chart have not yet extended so far along the circuit line as to form a complete circle, but were, when observed, in progress to do so.

It also explained the phenomenon of occasional dense columns of dust separated by comparatively clear spaces that are seen in almost every storm, and which is endeavoured to be represented in the sub-joined sketch in which the figures 1, 2, 3, 4 and 5, represent the smaller circular currents the general circuit line of which is represented by large arrows, the figures 6, 7, 8 and 9, indicating the spaces intervening between these currents.

It appears self-evident that as the circumference of two or more adjoining spirals only touch each other at a comparatively small part, such particular point of union must be less obscured by the floating dust and hence, so much more transparent than those parts where large quantities of impalpable sand, &c. are revolving as represented by the small arrows.

The onward course of this storm is represented on the chart by the large arrow. The cyclone was attended by some thunder, but no fall of rain took place, nor was the violence of the wind considerable; and by 8½ P. M. it had passed completely over the station, rendering the temperature very agreeable.

The above storm is one of a very interesting character, presenting various points of dissimilarity from any hitherto observed. Some of the points we gather from it are

*a.* The minor spirals of a storm may arise together, and attain their onward progress before the whole circumference of such cyclone has been completed by their lateral extension.

*b.* The circular movement of the atmosphere was from R. to L.

*c.* The appearance of the storm being much like what is represented in the sketch shows that such are in reality formed of spirals as already adduced.

21.—20th June, 1853. Cumuli and strati had partially covered the sky during the day. At 6 P. M. thunder in the W. was audible,

and then, a dense black rainy-like mass was seen approaching from that direction. The wind first struck from N. E. the rain was heavy and the wind became high. It is to be regretted that no good account was kept during the prevalence of the storm. Latterly the wind blew from N. W. and during the evening, the body of the meteor was visible in the E.

See chart VII. 1853. (Plate XXII.)

From the manner in which the wind veered in the above storm, we may presume that,

*a.* Its motion was from L. to R.

The following summary of notes refers so far as it extends, more to the prevailing appearance of the sky, and the nature of the weather than to any particular storm. These notes, taken from day to day state that,

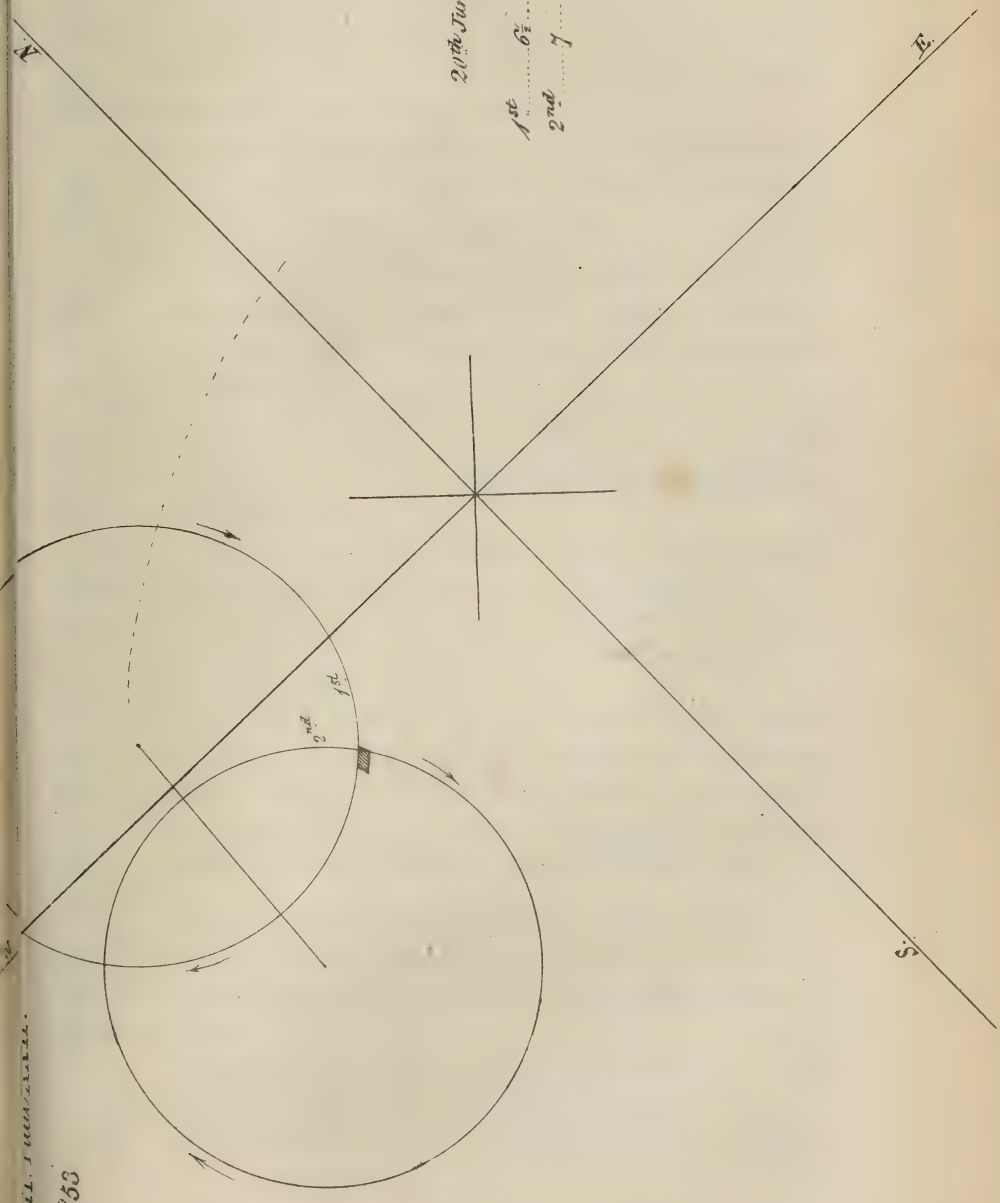
“On the evening of 25th June, there was a slight haze in the W. at sunset. The 26th was hot and bright (like the previous day) but the haze in the W. at sunset was greater. On the afternoon of 27th, a thick dust-storm came on (the whole of the forenoon having been hazy). The wind was E. and did not vary considerably while it lasted. On the 28th the sky was more or less hazy, although the sun was bright during a great part of the day. At gun-fire (A. M.) of 29th a dust-storm again came on from the E. and ceased about 5, 30 A. M. The forenoon continued hazy, the wind continuing to blow moderately from the E. till 10½, when it came on from N. but it did not appear that the current of air was otherwise than straight.

Every day up to 5th July, presented the same threatening appearance of rain as is described above, this appearance taking place at different points of the horizon alternately. The sky continued much overcast with cumuli, strati and cirri; and at times there was a tolerably severe puff of wind lasting from 10 to 30 minutes, loaded with dust, and cool.

These “puffs” always appeared to be composed of parallel currents. In the intervals between their occurrence, the atmosphere was close, and gave a sensation of oppression. On the expanse of plain around the cantonments, frequent small whirlwinds were from time to time visible, their track and circular motion appearing to follow no definite direction. It was distinctly evident however that the motion

UNIVERSITY OF CHICAGO

1853



20<sup>th</sup> June 1853.

1<sup>st</sup> ..... 6<sup>1</sup>/<sub>2</sub> ..... P. M. .... N. E.  
2<sup>nd</sup> ..... 7 ..... " ..... N. W.





of the air in these whirlwinds was more rapid on the side corresponding to the onward track than on the opposite.

On 5th July, about 6 A. M. a heavy fall of rain took place from N. by E. attended at first by a good deal of wind. About 9 (A. M.) the shower ceased, the thermometer outside the house (in the shade) being then 78° F. During the remainder of the day, a pleasant breeze continued from E. but without rain.

It ought to be noted here that the prevailing descriptions of cloud were electric cumuli; which were chiefly in S. E. before the occurrence of the fall of rain.

On the morning of 6th July, about 5 o'clock, a heavy fall of rain took place with thunder and lightning, a particular note of this shower was unfortunately not kept, but 2.8 inches of rain were ascertained to have fallen in about 2½ hours, which was the time during which it continued.

After this the weather continued to become gradually less hazy, and the sky less cloudy until the evening of the 10th when sunset occurred with the ordinary clear weather which usually characterises the hot season in the plains.

*Note.*—Although no distinct “storm” is described in the observations that have just been made, I am nevertheless inclined to hope that they will not be without interest in a meteorological point of view, as being a record of the changes and appearances which generally characterise the hot season.

It will be observed that the number of “storms” of which I have had it in my power to give even a general, and in some instances very imperfect summary, is only twenty-one, and it must be confessed that in more than one of these, the degree of atmospheric perturbation was hardly of that degree which would fully justify the appellation.

From attention to the phenomema presented by even this small number, however, a few interesting points, connected with them may be said to be ascertained, and these may be divided into the following heads.

1st. The line of circular motion, tracks of storms, &c.

2nd. Formation, and general phenomena of storms.

The remarks under each head bearing reference only to these

meteors as observed in the plains, and at a considerable distance from mountains, lakes or seas.

*1st.*

*a.* The circular motion of the atmosphere in cyclones may be from L. to R. (in the northern hemisphere) as in Nos. 1, 3, 5, 13 and 21.

*b.* It may be from R. to L. or contrary to the motion of the hands of a watch, as in 14, 18 and 20, and here I would observe that cyclones having this description of circular motion would appear from my small series of observations to be of less frequent occurrence than those of an opposite character, such as are generally believed to prevail south of the equator.

*c.* No circular movement of air can be detected in all storms, as 4 and 16.

*d.* It becomes difficult or even impossible from observations taken in only one locality to say positively, whether the current of air in a storm is rectilinear or circular, or if the latter, in which direction revolving, as 8 and 9, 14 and 15.

*e.* The onward course or track of a storm may be in a direct line, curvilinear or zig-zag, as in Nos. 10, 11, 13, 14 and 18.

*f.* The track of a storm cannot under all circumstances be detected (on land) as in No. 15.

*2nd.*

*a.* The occurrence of storms in the plains during the hot season is usually preceded by the appearance of certain phenomena, as strati in the W. 16 and 17, a loaded state of atmosphere from impalpable dust, as 6 and 19. Spiral columns of dust, or whirlwinds revolving and progressing in independent directions, 12.

*b.* They consist of revolving spirals, as shown in Nos. 10, 11 and 20.

*c.* These spirals may under certain circumstances attain a progressive motion before, by their lateral extension, they have completed the cyclone, as in No. 20. Yet under certain other circumstances, a cyclone may not at its commencement have any onward motion, as No. 3.

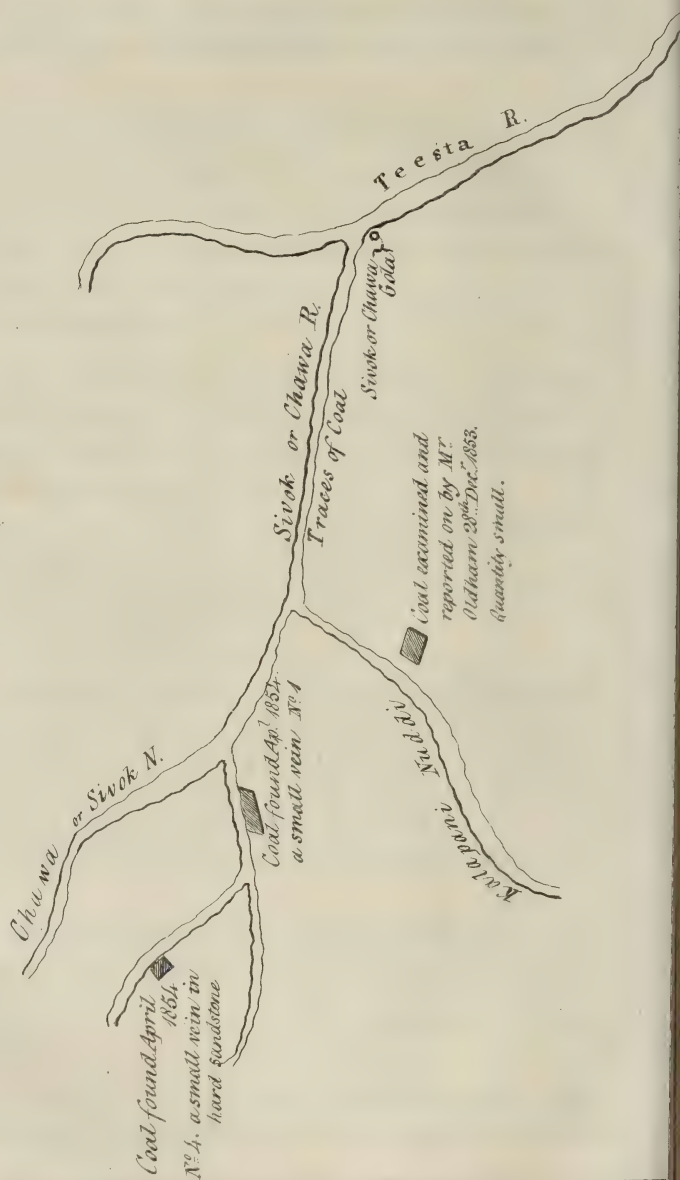
*d.* In some cases it would seem that in storms the greatest force of the wind occurs at inconsiderable heights from the surface of the earth, as in Nos. 10 and 11.





Sketch showing the points at which Coal has been found near the Teesta River  
to accompany Mr. Piddington's Report.

(Sig<sup>d</sup>.) A. Campbell



*e.* The diameter of cyclones undergoes modifications (under certain circumstances) as they advance.

*f.* The circular motion is sometimes lost immediately prior to their breaking up, as in No. 17.

*g.* But in other instances the cyclones break up, or seem to dissolve themselves, without any particular attendant phenomenon, as in No. 14.

Such then are some of the deductions that I have been induced to draw from such observations as I have had an opportunity of making, and I beg now to present them for comparison with those of other observers of this interesting branch of meteorological science.

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*Examination and Analysis of four specimens of Coal from the neighbourhood of Darjeeling ; forwarded by A. CAMPBELL, Esq., Superintendent.—By H. PIDDINGTON, Esq. Curator, Museum Economic Geology.*

#### NO. I. SPLINT COAL.

*From the bed of a small stream which falls into the Chawa Nuddee three miles above its junction with the Teesta.*

This coal is difficult to describe. In the mass the fracture would be, I think, laminar, dividing into rhomboidal parallelopipeds ; the smaller pieces incline to rhomboids, as does the fracture, which may be called hackly and cubical, sometimes very bright and bituminous-looking, and even slightly pavonine in spots ; at others with a strong ferruginous tarnish, which on the weathered surface becomes a thin coating of peroxide of iron. On some of the dividing joints and planes the coal is finely striated, and at some of the fractures it assumes the appearance of closely compressed columnar or globular masses as described by me in my report of the month of April, 1853, (Journal, p. 313), on Dr. Campbell's first specimen of coal from Darjeeling.

It does not soil the fingers, and is very brittle, but hard to pound, for it is long before it can be reduced to the state of coarse shining cannon-powder, and requires hard rubbing to reduce it to a fine powder ; but even this is not the sooty powder of the bituminous

coals, but still like very finely granulated gunpowder. When this powder is heated in a close crucible, for ascertaining the gaseous contents of the coal, it changes from a shining black to a bright black steely powder.

It flames well in the forceps, but does not melt or alter its shape, remaining a long time red hot till the exterior is a coat of reddish ash ; the smoke from the crucible is also highly inflammable.

The smell of the smoke is very peculiar, having nothing pungent or peaty, but being almost aromatic, so as to induce us to suppose that it contains a portion of succinic acid. It barely discolours a silver crucible, shewing thus that it contains no sulphur. Its streak is a dull black.

It is not at all sectile and only crumbles before the knife, differing in this from the former Darjeeling specimen, Journal Vol. XXII. p. 313 which was a true jet coal.

The ash is a dark fawn-coloured, but very light, powder, from which muriatic acid dissolves a portion of iron, leaving an ash coloured residuum.

There is no effervescence, showing the absence of lime.

It cokes to a bright crumbling cindery mass, of which the fragments incline more perhaps to the cubical than to any other form, but are really of all shapes. The larger pieces preserve their shape a little, though considerably swelled and split, but few will bear more than careful handling.

|                                |       |
|--------------------------------|-------|
| Its specific gravity is, ..... | 1.32. |
|--------------------------------|-------|

---

100 parts of this coal contain :

|                       |        |
|-----------------------|--------|
| Water, .....          | 6.80.  |
| Gaseous matter, ..... | 29.20. |
| Carbon, .....         | 61.10. |
| Ash, .....            | 2.90.  |

---

100.00.

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The brittleness of this coal and its tendency to absorb moisture, together with the utter friability of the coke, are considerable drawbacks to its economical value. It is in effect from its great purity, readiness to flame, and steady combustion, a very valuable

coal to be used on the spot, but I fear it would suffer heavy waste from breakage, if carried any distance.

## No. II.

### *Coal from the Mahanuddi.\**

The principal lump of this coal sent us reminds one of a section of a flattened stem; and the more so, that its dull exterior is strongly reeded in several parts.

Its fracture may be described as laminar and longitudinally curved in the lamina. In the cross fracture it is a very bright bituminous looking coal, sometimes, like the foregoing, shewing spots and rings like compressed balls of the size of a pea, or jointed columns of the size of a large quill or pencil. It is every where penetrated by stains of oxide of iron, but does not shew on the exterior any strong ferruginous coating like No. I.

It is very brittle and tough, and its streak is a dull brownish black.

Its smoke when burnt is somewhat sickly, mixed with an aromatic flavour which, like No. 1., may be succinic acid. It has no sort of pungency, but it discolours the crucible, though not strongly, so that it may contain a mere trace of sulphur.

It does not soil the fingers, and its powder in the crucible, when the gaseous constituents have been driven off, is not so bright and steely as No. I.

It flames well in the forceps, but does not melt at all. It cokes to a crumbling bright cinder.

Its Specific Gravity is, ..... 1.32.

Its constituents in 100 parts I found to be :

|                                    |        |
|------------------------------------|--------|
| Water, .....                       | 5.50.  |
| Carbon, .....                      | 56.40. |
| Gaseous matter, .....              | 33.60. |
| Ash, of a light fawn colour, ..... | 4.20.  |

---

99.70.

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\* Note by Dr. Campbell. This is the largest and most promising vein yet discovered in the Darjeeling territory. Some of the blocks in my possession are a foot square, and the vein where it has been exposed is described as being two feet thick.--A. C.



Like No. I. this coal is a valuable one, on or near the spot, for many, or indeed all purposes; but there would be very heavy loss upon it by carriage. It should however be recollected that these are at all events surface specimens, if not the mere *Top Coal* (or upper beds) of other and tougher veins; for toughness sufficient to render them better able to support carriage, is all that is required to render both these coals equal to the best yet found in India! Their constituents it will be seen approach very closely to the Laboan Coal (36.50 Gaseous; 61.35 Carbon; 2.15 Ash; see Journal, vol. XIX. p. 156); but this last has the appearance and tenacity of Newcastle Coal, which indeed it equals.

Dr. Campbell has not stated to me the exact point on the Mahanuddi at which this coal is found\* and I need scarcely say that this Mahanuddi is the river which, rising near Kursiong and running south till it passes about 18 miles to the east of the station of Purneah, curves then to the southeast and passing Plassey and Malda, falls into the Ganges opposite to Bogwangola. How far up it may be navigable will, of course, be an important question in the working of these coals, if the veins are workable ones.†

### No. III.

#### EARTHY SOOT COAL.

This singular substance is certainly a coal, for it contains all the elements of it, but is much like a dark pulverulent Plumbago at first sight; and especially the harder portions, which are, so far as we can judge, from the few bits sent, found interspersed throughout the pulverulent part in flattened lenticular masses. They will be presently described.

The principal part of this coal is a loose sooty black powder, full of glittering fragments, grains, and scales; which soils and adheres excessively to the fingers. I can only compare it to a mixture of lamp-black and a bright glance-coal dust. It feels *both* soft and gritty between the fingers, i. e. it is soft like lamp-black and gritty like coal-dust. It has no sort of resemblance to the Mineral charcoals formed by trap dykes crossing veins of coal.

\* It is within the hills and near the source of the river.—A. C.

† The Mahanuddi is navigable all the year round to Doolalgunge, 80 miles from its source: but small boats can ascend to Titalaya, 50 miles higher.—A. C.

This mixture again seems aggregated, rather than hardened, into masses which have just consistence enough to hold together, but which crumble and break with the greatest ease. On the fresh fracture they seem mere aggregations of the harder and softer substances and at times appear laminated, as if deposited by water or assuming a pseudo form of scaly graphite.

The somewhat lenticular masses which form the hard fragments are of a curved and flattened form, but remarkably bright on their external surfaces, which indeed have altogether the appearance of dark coloured graphite, and as some of them write well like black chalk, the illusion is more perfect; they are also sectile, and at times laminar. The cross fracture is a dull black.

I found a fair average of the massive kind of the earthy soot coal to contain in 100 parts—

|                                 |                       |                |         |      |
|---------------------------------|-----------------------|----------------|---------|------|
|                                 | Water,.....           | 10.00          |         |      |
|                                 | Gaseous matter, ..... | 9.75           |         |      |
|                                 | Carbon, .....         | 39.95          |         |      |
| Earthy<br>Matters.<br>and Iron. | } Silica,.....        | 28.60          | } 40.30 |      |
|                                 |                       | Alumina, ..... |         | 4.00 |
|                                 |                       | Iron, .....    |         | 7.70 |
|                                 |                       | <hr/>          | 100.00  |      |

It is thus a very impure, earthy, carbonaceous compound, to which I can find no parallel in any book accessible to me, and thus have distinguished it by the name of Earthy Soot coal, though the Soot coal of England contains, I think, much more gaseous matter. I forbear offering any speculation about it; but it would be curious to know if it becomes a graphite at a greater depth? its per centage of Iron being about that of the graphites, and it is impossible to say what these surface veins are an indication of.

No. IV.  
TEESTA COAL.

*From the bed of a small stream to the West of the Chawa Nuddi.*

This coal is accompanied by a specimen of the rock in which it is found, which is a compact, light, bluish-grey sandstone, with much white mica in its laminar partings.

It is a very fine-looking massive glance-coal, of a brilliant black, and evidently with a fine conchoidal fracture in the larger masses like the jets. The specimens we have are however for the most part very impure, and so mixed with thick veins and masses of the top sandstone, that it is difficult to pick a good piece for analysis or coking, or for taking the Specific Gravity, which I find to be 1.30.

It is not sectile, but breaks and crumbles under the knife on an edge. Many of the specimens are mixed with a very dark tough shale, which is almost wholly calcareous, though tough enough for a hornblende.

It flames well, and melts a little; the smell of the smoke is not pungent but rather disagreeable and sickly. It cokes, like Nos. I. and II. into light crackly and brittle masses, but which are of a brilliant shining black, while these last are comparatively quite dull; its coke is also, though brittle, not so much so as that Nos. I. and II.

I found 100 parts of it to contain

|                                                                                              |        |
|----------------------------------------------------------------------------------------------|--------|
| Water, .....                                                                                 | 10.00  |
| Gaseous matter, .....                                                                        | 30.50  |
| Carbon, .....                                                                                | 54.75  |
| Ash of a light red colour, principally Iron, with<br>trace of lime and a little silica. .... | 4.75   |
|                                                                                              | <hr/>  |
|                                                                                              | 100.00 |
|                                                                                              | <hr/>  |

A part of the water in all these specimens is no doubt due to the absorption of atmospheric moisture while pulverising, which cannot be avoided in this hot humid weather; so that this coal is probably even richer than it is here shewn to be by perhaps 5 per cent. in gaseous matter.

As it is, however, if there is only a good supply of it, and in a spot where cheap carriage can be procured, it is undoubtedly a most valuable coal, and in every thing, except its coking, equal to the good English or Welsh coal, and for many purposes the absence of Sulphur may compensate for the brittleness of its coke.

*Literary Intelligence.*

Defrémery's paper on the reign of the Seldjuk Sultan Barkiarok, 1092—1104 A. D. is concluded in No. 7, (September and October, 1853) of the *Journal Asiatique*. The materials for this contribution to history have been drawn from Arab Authors, and principally from Ibn Djouzy and Ibn Alathir, whose statements are in many places opposed to these of Mirkhond, Khandemir, &c. The 3rd vol. of Weil's *History of the Khalifs*, lately published, has supplied many omissions in Herbelot's article, but it does not give such particulars as are to be found in this notice.

Sédillot reviews the recent translation by Wœpcke\* of a treatise by Omarkheiam, a celebrated mathematician and astronomer of the 11th century, who reformed the Persian Calendar by command of the Seldjuk Melikshah. His object is to determine if possible the point up to which the Arabs carried their knowledge of mathematics, a first acquaintance with which science they derived, he thinks rather from the Greeks than from India. However this may be, and though the *Siddhanta* had been translated in the reign of the Caliph Almansor (754 A. D.) it is certain, he says, that the Greek system of Algebra was what prevailed in the schools of Bagdad during the 9th and 10th centuries. W. Bland, in an interesting letter to G. de Tassy, brings evidence to show that Masoud (d. 1130 A. D.) wrote a complete *diwán* of Hindooee guzzals, and to the letter is appended an observation by de Tassy in reply to Dr. Sprenger's doubts as to whether Saadi had ever composed in *Rekhta*. See this *Journ.* Vol. XXI. p. 513. Both these poets, it seems, wrote Arabic verses, and others of their countrymen have written Turkish verses, the latter language, as Mr. Bland points out, standing much in the same relation to Persian as does Urdu.

No. 8, of the same journal (Nov. and Dec.) opens with an extract from an incomplete memoir by Mr. Belin on the origin and consti-

\* The Oriental Translation Committee are apparently about to bring out another translation by this author of an interesting commentary on the 10th Book of Euclid, an Arabic MS. of which has lately been found in the Imp. Lib. a Paris.



tution of Wukfs, two decisions by Turkish courts on questions arising out of them being given at length. Then follows a notice by Mr. Renan of a fragment of a gnostic work, bearing the absurd title of the Testament of Adam, and forming a portion of the Syriac fragments in the Vatican Library. The third paper is the continuation of Du Caurroy's '*Législation Sunnite, rite hanèfi*' a series of articles which will now be stopped, the writer having died in November last.

The January No. for 1854, contains the first of a series of three Memoires on the Administrative and Municipal Institutions of China by M. Bazin. There is then an analysis of a very interesting treatise on sword blades, written in our 14th century—De Hammer, who is the contributor, draws attention to the comparatively subordinate regard in which the Arabs held the Damascus blade introduced into Europe by the Crusaders.

De Saulcy's reading of the Behistoun inscription, prefaced by a few words of explanation of his reasons for differing from Rawlinson, occupies the whole of the February number of this Journal.

The American Oriental Society have published an extra No. of their Journal for the reception of two translations of Tamul works by Mr. Hoisington of Ceylon, and for an article by Mr. Mason of Tavoy headed '*Mulamuli*,' being the abridgment of a volume translated into Talaing from the Shan language, at Labong in 1768, but written originally in Pali. The titles of the Tamul works are '*Tattuva Katṭalei*,' or Law of the Tattuvam, and '*Siva-Gnana-Potham*,' or instructions in the knowledge of God.

A notice appended to this No. announces the rules which have been laid down by the United States Missionaries for the uniform spelling of Armenian and Turkish proper names. The rules have been drawn up by a Committee sitting at Constantinople, and it is much to be hoped, that this example will be followed by orientalists generally.

The long expected memoir on the Scythic version of the Behistan inscription by Mr. Norris, for which the publication of the 1st part of the Journal of the Royal Asiatic Society had been kept back, has made its appearance. Besides facsimiles and transcripts of the inscription with a verbal translation of it, the memoir contains a

verification of the alphabet, a Grammatical sketch with a Vocabulary of the Scythic language. "It is assumed that the language in which the inscription was written, was that of the Nomadic tribes who inhabited the Persian empire; and the memoir sets forth the grounds on which that assumption rests, and which appear to prove that it is allied, grammatically, and to a small extent verbally also, with the so-called Scythic languages, and especially with the Ugrian branch of that class. The interest of the memoir is especially philological, and its great value will consist in the further aid it will probably afford in settling the meaning of some passages in the Persian text, while it may be fairly anticipated that the Assyrian, through which alone we can expect any increase to our acquaintance with the ancient history of man, may receive from these publications additional illustration."

The Annual Report of the same Society read on their 30th Anniversary Meeting in May, 1853, from which the above extract has been made, gives the following interesting intelligence of materials left by the lamented Burnouf.

"The oriental scholar will be very much interested by four large folio volumes, making from two to three thousand pages, containing full indexes to all the Zend words found in the Vendidad Sadi, with the variants of the several editions, forming a complete Zend Dictionary, which will be an invaluable aid to those who are now laboriously endeavouring to get a knowledge of the Zend without it. Several other works on the Zend language and monuments are also found very nearly complete among Burnouf's MSS. Among the Sanscrit papers left, is an index to Panini, containing all the axioms in alphabetical order. This is quite ready for the printer. A Pali Grammar has been also found, nearly complete, and a Pali Dictionary; besides a very considerable mass of MSS., some prepared and completed for the press, and others intended to be so. The list is given in the memoir of M. Barthélemy St. Hilaire, from which chiefly this article is abridged. "Although copious," the writer informs us, "that it does not contain all the valuable remains left by Burnouf."

The Journal of the Bombay Branch (Jan. 1854) is for the most part occupied by Dr. Carter's Summary of the Geology of India.

Another instructive paper by the President Dr. Stevenson on the Cave Inscriptions, Dr. Impey's description of the Koolvee caves, sent to this Society some months back by the author, and a collection of communications from Mr. Frere on antiquities in Scinde complete the No.

No. II. of the *Zeitschrift* of the German Oriental Society has a philological paper by Dr. Hitzig, in which is discussed the origin of the names of three cities in Syria—Mabug, (Hieropolis) Damascus, and Tadmor. Grotefend, whose death has since been announced, explains some of the more modern records in the Babylonian Cuneiform character, and Rückert compares Mohl's edition of the *Shahnameh* with the Calcutta edition. Professor Holtzmann's essay on the 2nd class of Achæmenian Cuneiform writing is continued, after an interval of more than a year, and a translation by Professor Fleischer of an Arabic MS. on the statistics of Damascus completes the original contributions.

From the Westminster Review for April we learn that Benfey has published a *Chrestomathia* of Sanskrit works which contains 'an excellent exposition of the laws of Sanskrit metre.' The selection however is entirely from already published texts. Monier Williams' edition of *Sakuntala* is mentioned as being a still more reliable text than Böhtlingk's German edition. The matter of the Indian Scholia is given in English notes with frequent translations, and explanations. Mr. Cowell of Oxford has published both text and translation of the *Prākṛita-Prakāsa* of Vararuchi, with the commentary of Bhamaha. Dr. Arnold of Halle has published an Arabic *Chrestomathia* consisting of selections from new and mainly unknown works. Like Kosegarten's it contains a glossary though a less full one. The first *Fasciculus* (there will be six) of Vuller's *Lexicon* is out—its contents are strictly confined to Persian words. Spiegel's *Avesta*, of which the 1st vol. containing the *Vendidad* is published, is said fully to maintain the deserved celebrity of the Imperial Press at Vienna, where new Zend types have been prepared for the work.

Major Cunningham's volume on the Bhilsah Topes which has lately been received from England, works up the mass of materials stored in this journal, and the results of his own and Lieut. Maisey's examination of the Sanchi and its contiguous topes into a connected



and consistent history of Buddhism in India. The work is illustrated by plans of the topes, and of the architectural remains found in and around them, and by drawings of some of the sculptures from the Sanchi gateway. All archæologists will not concur in the author's deductions from, nor perhaps in his readings of, the inscriptions of which fac-similes are published, but all will admit the skill with which he has constructed his history and appreciate the ability with which he has applied the varied knowledge of his subject which he has acquired. The work, it is hoped will be done justice to in Germany, and it will derive additional interest from the publication, shortly expected, of Lieut. Maisey's official report with its illustrations, to the fidelity of which Major C. here bears testimony.

The conjecture given in the chapter on Chronology as to the cause of the discrepancy of 66 years in the dates assigned by the Buddhist and Brahmanical annals to the inauguration of Asoka is at least a plausible one and receives support from the opinion quoted of Mr. Turnour. Major C. thinks that Asoka's conversion may have been taken by the Buddhist, as the date of the true foundation of the Mauryan dynasty. He then proceeds to notice Professor Wilson's objections to the identification of the Priyadarsi of the edicts with Asoka, which in our opinion he successfully refutes, and which may perhaps be now withdrawn, for it cannot be denied that the discovery, in No. 2, Tope at Sanchi, of the relics of the Hemawunta missionaries in the same casket stamps authenticity on the narrative continued in the Mahawanso and Dipawanso.

The chapter on the Gupta dynasty will be read with great interest by Mr. Thomas, who will have, Major C. thinks, to revise his chronology of the Sah kings of Gujrat. The true Gupta æra as derived from all sources is here stated to begin with 319 A. D. The earlier date assigned to it by Mr. Thomas is attributed to the erroneous translation by M. Reinaud of a passage from Aboo Rihan.

The Buddhist origin of the festival of Jugunnath has already been more than once mentioned as probable. Dr. Stevenson, Col. Sykes and Mr. Laidlay have, with more or less reserve, expressed opinions in favour of the supposition, and Major C. now cites the evidence afforded by 'the absolute identity in form of the modern



Jugunnath and his brother Balaráma and sister Subhadrá with the Buddhist monogram or symbol of Dharma.' There is every reason to believe that the annual procession observed by the Buddhists and described by Fa Hian was adopted by the Brahmans as a ceremony too popular to be then safely suppressed.

Major C. will see that our Society has already made a move in the direction indicated in his Preface. The prosecution of the Sar-nath excavations is quite compatible with simultaneous researches on and around the site of Rajagriha.

The same author's vol. on 'Ladak' has also reached our Library. It is a valuable contribution to our knowledge of the physical features of the Western Himalayas which are not to be distinctly gathered from the pages of his fellow-traveller Dr. Thompson. The work moreover as pointed out in the Preface enters into subjects interesting to the antiquary, and contains a comparative vocabulary which will be most welcome to the philologist.

The 1st vol. of the labour of love on which our learned Secretary Dr. Sprenger has been so long engaged was published just before his departure for Egypt. This portion of his 'Catalogue' is devoted to the MSS. of Persian and Hindustani poetry in the Lucnow libraries, but the vol. has been arranged differently from what was originally intended in consequence of the author's failing health. It was commenced too under happier auspices than it was abruptly closed—for the instigator of the undertaking and the constant co-operator with the author, died at the Cape just as its last sheets were passed through the press. It is much to be hoped that the Hon'ble Court will direct the prosecution of the work.

Of the late Sir H. Elliot's great unfinished work, the Society has been presented with a sample just sufficient to show the value of what we have been deprived of. Lady E. has bestowed on the library a copy of the vol. printed at the Cape for private circulation, and alluded to in Dr. Sprenger's List of Sir H.'s MSS. in our last No. The references in this Appendix show the complete conversance of the writer with every thing that had been written on subjects connected with his work—a feature indeed in his published 1st vol. which drew from Fleischer a remark highly flattering to the 'Indian Secretary.' Few orientalists indeed in this country

can, like the late Sir H., keep pace with the progress made in German closets.

The concluding chapter of the appendix is one which we shall perhaps have occasion to notice separately. It is headed 'Indian Voyages and Travels' and is a most valuable contribution to Indian Bibliography.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JUNE, 1854.

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At a meeting of the Society held on the 7th instant at the usual hour,

The President in the chair.

Read and confirmed the proceedings of the last month.

Donations were received—

1. From the German Oriental Society through Dr. R. Anger, Librarian. *Veteris Testamenti Æthiopici*, Tomus primus.

2. From J. Henry, Esq. Secretary of the Smithsonian Institution. The latest publications of the Academy (for details vide Library Report.)

3. From Capt. Vaughan through Mr. Theobald. A copy of his Grammar of the Pushtoo Language.

4. From Major J. Abbott, Indo-Grecian sculptures from the N. W. Frontier.

Major A. states: "Those in the large box were dug from the site of a Temple on the left Bank of the Indus, called Kala, close below Ghazi Huzara. The winged female is from another old site at present called Shah ke Tere in Quatur. They are very inferior in grace and execution to those from Trans-Indus; yet they may form the nucleus of a collection of higher order. Those at Kala seem to have belonged to a Boodhist temple of small size, but very richly and elaborately sculptured, the material being black clay-slate. It is a curious fact that all Boodhist remains bordering the Indus, (they are very numerous) bear undoubted evidence of Grecian art. But this was a portion of the most ancient and classic soil of the Boodhist. It was here that Foe left the impression of his foot and the impression of his wet clothes upon a stone. Here he planted the sacred willow. Here he good-naturedly gave his body to save from death a famishing Tiger. Here he used his skin for paper and one of his bones as a pencil.

Note.—This opportunity is taken of publishing a drawing made from a figure which was picked up by a man ploughing in the neighbourhood of Rawulpindee; it probably formed part of a figure in relief and of some building contemporary with that of Jemal-guire. The drawing was exhibited at the April meeting by Mr. E. Bayley. Ed.







Here having listened to half a poem he sacrificed his person and his life. Here Joulai sold himself to his enemy to save from starvation a famishing Brahman. Here Joulai broke one of his bones, the marrow of which was still shown hardened on the rock. Here Joulai hacked his own body for the service of a sparrow-hawk to ransom thereby a dove. Here Joulai resuscitated the corpses of those slain by famine and disease and cured the sick. Here Joulai changed himself into the serpent Souma. Here Joulai, as king of the Peacocks, struck with his beak a copious spring from the rocks. Here the relics of Joulai being carried on a white Elephant, the latter fell and died and was changed into a rock. Here Joulai, piercing his body, gave his blood to nourish the Demons, &c. &c.

“It would be difficult to find a more ancient or revered theatre of Boodhism than this tract, extending from the Jelum to Jullalabad, yet, as I have observed in a late paper, the oldest coins contained in the Boodhistic monuments are of the 1st and 2nd centuries of our era, though a beautiful coinage had there been current in those parts 400 years, and though many of the monuments are attributed to Asoka.”

Mr. H. B. Riddle, C. S. duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

The following gentlemen were named for ballot at the next meeting.

Hon'ble E. Drummond, C. S.;—proposed by Mr. Grote and seconded by Dr. A. C. Macrae.

G. F. Edmonstone, Esq. C. S.;—proposed by Mr. Allen and seconded by the President.

Capt. H. C. James 32d, Regt. N. I. proposed by Capt. Thuillier and seconded by Major Baker.

J. Watson, Esq. C. S. proposed by Capt. Layard and seconded by Mr. Grote.

The President then addressed the meeting, mentioning how desirable it was that an effort should be made to obtain the assistance of Government in prosecuting the excavations at Sarnath. He believed that, with the exception of a short interval during which Mr. E. Thomas was at Benares, the excavations had not been touched since the departure of Capt. Kittoe; it had been suggested that, if ap-

plication was made to the Government of the N. W. Provinces, some assistance might be obtained towards completing an undertaking which had been commenced by Major A. Cunningham nearly 20 years ago. The present Lieut.-Governor, lately a V. P. of the Society, had, it was well known, always taken a lively interest in Capt. Kittoe's proceedings, and would be likely to support the Society's movement.

The suggestion of the President was approved and adopted by the meeting.

Communications were received—

1. From the Government of Bengal, through the Under-Secretary Mr. W. G. Young, enclosing copies of correspondence regarding the copper mines of Dhulbhoom. The following is Mr. Ricketts's report on the mines.

Para. 48. "In consequence of what I heard from the principal assistant stationed at Chyebassa, and also from several parties in Calcutta, I penetrated to the copper mines.

49. "Those I visited are situated about eight miles North West from Kalkapoor in Dhulbhoom, and nine miles in the North East from Kessul in Singbhoom. There are traces of considerable diggings in many places, but of very old date. The hills are cleared of jungle, and in the woods below, the heaps of refuse may still be traced. Though the hills in which the ore is found are far in the woods, there are no real difficulties of any kind. Already supplies of the common articles of food may be procured at a short distance, there is a small supply of water near the mines, and it might easily be increased to any amount by throwing drains across some of the valleys close at hand. A good road to Kalkapoor, and to Chunderluka on the Sabenreka river, may be made at but little expense, besides cutting the jungles. The Rajah of Dhulbhoom is quite ready to give speculators a puttah for the lands on reasonable terms. He would give the hills within a circle to be marked out at a very light rent on perpetuity, he receiving a percentage on the produce. He would readily on these terms afford the farmer his assistance in the procuring of people. But no assistance of that sort would be required; good wages would soon bring the hardy labourers of Chota Nagpore.

50. " I have forwarded specimens from the old mines, and also from the new veins, discovered not long ago, where the digging has been carried only six or eight feet from the surface. I am not qualified to give an opinion respecting the value of the ores. Capt. Haughton says ; ' From examination of the ore made by myself, it appears that 24 per cent. of pretty good metal might be safely reckoned on from the Jampore Ore, which much resembles that of Sandoo. Its chief excellence however lies in the softness of the ore, which allows of its being easily worked and in its freedom from sulphur. This last quality greatly simplified the process for the extraction of the metal. All the mines, which appear to be very extensive, require examination and careful analysis by a competent person.

51. " ' I think it might be worth the while of the Government to expend a few thousand rupees in thoroughly testing the produce of these diggings ; should they prove remunerative, doubtless capitalists would immediately come forward to take up the speculation.

" ' Should the veins prove unproductive, still the small outlay will not have been without advantage, if it teaches the people of these parts how to work the richer veins. It would be necessary to enter into an engagement with the Rajah to give him a portion of any produce, and an assurance should be added that the Government would not continue in occupation for above three years, when he might take up the speculation himself, or make an arrangement with others.

52. " ' Though gold is found in the rivers, it does not appear that an attempt has ever been made to endeavour to trace the metal to its bed. As is usual in this part of the world, the rivers rise and run the first miles of their course through thick forests, which are seldom entered by man, and could not be entered, except for a very short period of each year, without great risk ; they are so unhealthy. The discovery of a single nugget of any size would soon induce many of all classes to brave any amount of miasma, but at present, natives are entirely incredulous of the probable existence of beds from which the small grains found in the sand of the rivers are washed, and any search is regarded as visionary and absurd.' "



The Assay Master having examined the specimens forwarded by Mr. Ricketts, reported their metallic contents to be as under :

|        |              |
|--------|--------------|
| No. 1, | 12 per cent. |
| „ 2,   | a trace      |
| „ 3.   | 9 per cent.  |

2. From the Government of the N. W. Provinces, through Mr. Assistant Secretary C. P. Carmichael, forwarding copy of a Meteorological Register kept at the office of the Secretary at Agra, for the month of April, 1854.

3. From Captain Dalton, Debrooghur, noticing the existence of certain ruins near the source of the Seesee river.

The following is an extract from Captain Dalton's letter : " Since I left Debroo I have visited some very interesting ruins of temples in the hills, from which the Seesee river emerges. There is not now an inhabitant within 15 miles of the spot, and a year or two ago the existence of these temples was not known even to the gold-washers, who annually pursued their excavations in the river just beneath them. My attention was directed to them by Major Hannay, who found them out, and removed to Debroo a Doorga that he found there."

4. From Lieutenant Newall, Horse Artillery, through Captain Thuillier, a paper entitled, Sketch of the Muhammadan History of Cashmere.

5. From Dr. Gordon, H. M. 10th Regiment, through Captain Thuillier a paper entitled, a Note on the Topography of Murree.

From Mr. Piddington, Curator of the Museum of Economic Geology, the following papers :

1. A Twenty-third Memoir on the Law of Storms.

2. Examination and Analysis of four specimens of Coal from the neighbourhood of Darjeeling, forwarded by Dr. Campbell.

3. Do. do. of Dr. Campbell's specimens of Copper ores from Darjeeling.

4. Note on the Peat of the Jheels of Bengal.

The Curators and the Librarian submitted their usual monthly reports.

*Report of the Curator Museum of Economic Geology.*

*Geology and Mineralogy.*—We have received from Walter Elliott, Esq. Madras C. S. a box of fossil shells and rock specimens, of which he says,—

By the *Paragon*, which sailed some days ago from Coringa, I sent you a box for the Museum of Economic Geology containing some fossils and minerals, from a curious formation about two miles north of Rajahmundry near the village of Kátéru.

The fossils were brought to notice in quarrying some limestone strata for the great works at Dowlaiswaram constructed by Col. Cotton. They consist of shells, which appear to me to be the same as those now found in the sea on this coast, and they occur with the lime under a bed of trap rock over which, where it is covered, lies a quantity of black Cotton soil. The ground slopes from a small hill towards the place where the quarries have been opened about 400 or 500 yards distant, the hill is also trap.

The following is a section of the quarry which was first opened when I visited the place in 1850.

|                                           |    |    |    |    | F. | Inches. |
|-------------------------------------------|----|----|----|----|----|---------|
| Black soil, ..                            | .. | .. | .. | .. | 3  | 0       |
| Trap rock, disintegrating,                | .. | .. | .. | .. | 5  | 0       |
| Limestone, ..                             | .. | .. | .. | .. | 1  | 0       |
| Clay and gravel, ..                       | .. | .. | .. | .. | 0  | 8       |
| Yellow clay and sand,                     | .. | .. | .. | .. | 0  | 3       |
| Limestone, ..                             | .. | .. | .. | .. | 1  | 0       |
| Clay and sand, ..                         | .. | .. | .. | .. | 0  | 4       |
| Limestone, ..                             | .. | .. | .. | .. | 1  | 0       |
| Clay shale, white, yellow, purple, &c. .. | .. | .. | .. | .. | 2  | 4       |
| Basalt with zeolites, ..                  | .. | .. | .. | .. | 14 | 0       |

beyond which the excavation was discontinued.

The shells occur immediately below the basalt, generally in indurated mud, often very little changed; in other places a bed of a fibrous mineral like a fibrous limestone\* occurs instead of the shells, from 2 to 4 inches thick.

I again visited Kátéru about two months ago, the quarries are now opened much nearer the hill. The limestone bed is thicker and more solid, and the superincumbent basalt of greater thickness also and not covered with soil. The latter is of the same kind as that I have observed in the Dekhan composed of rounded nuclei covered with numerous concentric coatings, which peel off when exposed to the air. The following is a section of the quarry as I saw it on the 13th January.

\* Which it is. H. P.

|                                       | F. | Inches. |                             |     |
|---------------------------------------|----|---------|-----------------------------|-----|
| Basalt, .. ..                         | 12 | 6       | Specimens Nos. 1 and 2      |     |
| Greenish, unctuous, indurated clay, 2 |    | 8       |                             | 3 4 |
| Fibrous limestone, .. ..              | 0  | 1½      |                             | 5 6 |
| Highly crystallized limestone,        | 3  | 0       |                             | 7 8 |
| Basalt, .. ..                         | 2  | 0       | and probably to a consider- |     |
| able depth.                           |    |         |                             |     |

---

Total.    20    3½

In another part the series was

I. Basalt

II. Greyish friable clay containing shells, .. .. 9 9

III. More compact clay with larger shells, .. .. 10

IV. Limestone less highly crystallized.

V. Basalt.

Besides the numbered specimens, I have put a number of others into the box, and one or two pieces of sandstone from the hill at Dowlaiswaram, 4 miles South of Rajahmundry, which also bears the appearance of being of igneous origin. It is of this the Anicut is constructed.

Opposite Rajahmundry an extensive range of low hills occurs in the neighbourhood of Paugady the first dák bungalow on the road to Ellore, the whole of which appears to be of a similar formation to Kátérú, I was told that oyster shells had been found there.

*Museum of Economic Geology.*—I was applied to by Messrs. Oliva and Co. of Calcutta for information regarding the Peats of Bengal. This information was desired for some French speculators who are manufacturing turf at home and thought of extending their operations to India. Mr. Daly of the House of Correction obliged me with some of the common peat earth of the jheels, which is extensively used for manure all over the country, and some of the same substance coked, which like the Bog-peat of Ireland Mr. Daly has found to be an excellent fuel; and also valuable from its de-odorising properties. Being well acquainted with this substance, I read the substance of my reply to Messrs. Oliva's reference, as it contains many facts which are not generally known and are of interest both in a geological and economical point of view.

“I have had extensive opportunities of being acquainted with this substance, having when a planter, used hundreds, not to say thousands, of tons of it as manure, and dug through thick beds of it down to the bed of the Jheel so as to see it in all its stages.

“The Peat of Europe, it is well known, is formed from the decay of mosses of various kinds\* of which the new plants grow on the half decayed beds of the old ones, but our Indian Peat, usually called *Bodh Mattee* in Bengal, is formed by a different process and, mostly, from a single plant the *Oryza sylvestris* or *Ooree Dhan* (wild rice), as it is called by the natives. In some parts of the ancient beds of the rivers or depressions of the soil, which form sometimes broad and extensive lakes, and at others long narrow ones of several miles in length, and which are all called *Jheels* in Bengal, the plant springs up where the soil is favourable to its growth during the early part of the rains, and rising with the water, which it covers with its slender leaves, gives those parts the appearance of a green rice field, though the water may be from 10 to 15 feet in depth. In the month of October when the waters begin to subside, its seed, which is a very sweet, small-grained rice, ripens, and the plant gradually dies and sinks down with the waters, which sometimes leave it dry, forming a deep bog matted over with the stalks of the year's growth. These stalks are cut and dragged out in large quantities by the *ryots*, and being roasted on hurdles over a fire are stacked up for food for their cattle in the dry months, but vast and often thick beds of the peat remain, which have accumulated for centuries from the first formation of the *Jheel*, and in digging through the beds the stems and leaves may be traced in all stages of decay as with the mosses of the bogs. A few other aquatic plants, *Valisneriæ*, *Nymphææ*, &c. may also be traced amongst them, but as a general rule the greater portion of the peat of the *jheels* is formed from the *Oryza sylvestris*, which appears to flourish on spots which it has appropriated to itself. Near the borders of the *Sunderbunds* and on the Western shores of the *Hooghly*, are also found beds of peat which seem to have been formed by the decay of jungle destroyed by inundations or sinkings of the soil, and beds of this are found in all the lower parts of the *Delta* at variable depths when wells are sunk, or canals or tanks are dug; but these, if thick enough for working as peats, would require a mining process to extract any quantity of them, and it is the surface beds exposed and renewed annually, as I have described above, which afford the manure which is so extensively used by the *ryots*.”

H. P.

The Railway Company having applied to the society for information regarding Iron and Iron ores, which was referred to me by the Council, they were furnished with a complete catalogue of the specimens existing in the museum, with a note on the subject which it may be worth while to put upon record here.

\* Principally *Sphagnum palustre*.



*Note with a Catalogue of iron ores, washings, and smeltings ; for the  
Railway Company.*

To the following tolerably extensive series of ores, washing and smeltings there is little to be added which has not already been said in Messrs. William's and Oldham's reports ; but we may say with some truth that in India, except in the mere alluvial districts, it is much more difficult to say where iron ore is *not* found than where it is so. This is as regards the mere ore. As regards the other great requisites for the profitable production of manufactured iron, however, fuel and limestone, and carriage to a market, the facts, so far as known to us, are reduced to narrower limits, for except for the finer kinds of ore, and in very profitable situations, it may be doubted if forest fuel, however abundant it may at first be, can either be used profitably, or supplied for manufacturing to any extent worth the risk of establishing large works. The small native works are easily removed from place to place in an iron district, whenever the carriage and other charges of the charcoal become expensive ; and the forest soon grows up again in the abandoned quarters ; and another generation of smelters come back to the old spots where their fathers and grandfathers worked before, to allow *their* exhausted forests to be renewed for their children. With large works this is out of the question, and it might be worth enquiry in such districts as Birbhoom and Bundelcund to know if it would not be more profitable to the European to undertake, not the smelting, but the refining, puddling and rolling processes only ; purchasing the crude iron from the native smelter and trusting to the demand, and, above all, to correct and punctual payments by and from the hands of Europeans, without the intervention of any Sircar or native whatsoever, for an increase of and eventually an abundant supply of the raw material.\* Let them but once find that a lot of crude smeltings can be transmuted into silver as readily as a Bank Note can be changed in Calcutta or London, or a rupee into pice and cowries in their own bazars, and I should have little fear of the supply.

So far as an extensive experience of business in the Mofussil both as a planter and manufacturer enables me to judge, I should say that, unless under the most favourable circumstances, all the preliminary operations should be left to the natives, substituting only gradually improved furnaces and the like, if they can be persuaded to adopt them. This as regards the districts where forest fuel is to be depended on. Where coal can be obtained all the conditions of the problem become changed, and iron smelting is then

\* No one who has not seen the effect of rigidly excluding Sircars, and even pen, ink and paper from all ready money transactions with native dealers and ryots can imagine the effect of it : I speak from extensive experience.

a process which only Europeans can profitably attempt ; for natives assuredly would not do so, and the questions of limestone and markets must be duly weighed beforehand. Our smelting specimens Nos. 41 to 45 seem to shew that the kunkur can be used as an efficient limestone flux containing as it does from 50 to 80 per cent. of carbonate of lime ; for these were produced in a native smelter's furnace. It should however be tried on a large scale before any thing is based upon it.

(Signed) H. PIDDINGTON,

18th March, 1854.

*Cur. Mus. Eco. Geology.*

I have also put into the form of a paper for the Journal, the description and analyses of Dr. Campbell's Darjeeling copper ores, of which, though the ores turn out to be poor, and certainly not workable to a profit so far as the mere surface specimens go, it is useful to preserve a distinct record for the guidance of future explorers ; who will learn at once that their business is to set about sinking a good shaft as deep as the native well-sinkers can carry it before they give up their enterprize, for I again repeat that the results of these examinations of ours do not express what the mine or vein is, as miners understand it, but what is found at the surface ; and this is as true of the good results as of the bad ones.

The disappointment then as regards these ores may be but temporary ; but in the mean time I am happy to be able to announce as some compensation for it, that Dr. Campbell's indefatigable and persevering researches in his territories have been rewarded by the discovery of two very good and one excellent (in all three) veins of coal on the Teesta and Mahanuddi. There is also with them a very singular variety of an earthy Soot Coal which may be an indication of plumbago or of a valuable kind of coal below.

I have put the detailed descriptions and analyses of these coals also into a separate paper, which will well repay perusal by those who are interested in such matters ; briefly, I may state here that No. I. of Dr. Campbell's coal contains only 3 per cent. of ash and is free from sulphur ; but then it is very brittle both as coal and coke, being a true splint coal, and thus would suffer great loss in carriage which is a serious drawback on its value.

No. II. contains  $4\frac{1}{4}$  per cent. of ash only but is also, like No. I. very brittle, these two would otherwise be equal to the Laboan and average Newcastle coals, which as to constituent parts they closely approach, but want the cohesion which these last possess.

No. III. is the singular earthy soot coal which I have mentioned above, it contains 40 per cent. of carbonaceous and 40 of earthy matter with only 10 per cent. of gaseous matter.

No. IV. is a first rate Glance-coal, in all respects ; containing  $30\frac{1}{2}$  per

cent. of gaseous and  $54\frac{3}{4}$  per cent. of carbonaceous matter with only  $4\frac{3}{4}$  per cent. of ash and its coke though brittle is by no means so much so as the two first ones, so that altogether and bearing in mind that all we have of these coals are but specimens of the "Top coal," as it is called by the miners, we may hope that this coal, if only abundant, will be equal or superior to any in India.

Dr. Campbell has also forwarded a valuable specimen of Magnetic iron ore from near Punkabarri.

H. PIDDINGTON.

#### LIBRARY.

The following accessions have been made to the library since the last meeting.

#### *Presented.*

Veteris Testamenti Æthiopici Tomus primus, sive Octateuchus Æthiopicus. Edidit Dr. Augustus Dillmann. Lipsiæ, 1853, 4to.—BY THE GERMAN ORIENTAL SOCIETY.

Selections from the Records of Government North Western Provinces, Parts XIII. XIV.—BY THE GOVERNMENT.

Selections from the Public Correspondence of the Punjab Administration, No. VII. 4 copies.—BY THE CHIEF COMMISSIONER OF THE PUNJAB.

Selections from the Records of the Bengal Government, No. XIV. Papers relating to the Establishment of the Presidency College of Bengal.—BY THE GOVERNMENT.

A Grammar of the Pooshtoo Language, by Capt. John L. Vaughan. Calcutta, 1854, 8vo.—BY THE AUTHOR.

Smithsonian Contributions to Knowledge, Vol. V.—BY THE SMITHSONIAN INSTITUTION.

Sixth Annual Report of the Board of Regents of the Smithsonian Institution for the year 1851. Washington, 1852, 8vo. pamphlet.—BY THE SAME.

Portraits of North American Indians, with sketches of Scenery, painted by J. M. Stanley, and deposited with the Smithsonian Institution.—BY THE SAME.

Norton's Literary Register, 1853, 3 copies.—BY THE SAME.

Annals of the Astronomical Observatory of Georgetown College, D. C. No. 1. New York, 1852, 4to.—BY THE SAME.

Maury's Sailing Directions. Washington, 1852, 4to.—BY THE SAME.

Erreurs et Inconsequences des Academiciens François touchant les Auragaus. Par le Dr. Hâre, New York, 1853, 12mo.—BY THE SAME.

Initiatory attempt to define the species of *Hedychium* and settle their synonymy, by Dr. N. Wallich.—BY THE AUTHOR.

Summary of the Geology of India between the Ganges, the Indus and Cape Comorin, by H. J. Carter, Esq.—BY THE AUTHOR.

Indische Studien, von Dr. Albrecht Weber, III. Bandes, Erstes Heft.—BY THE GERMAN ORIENTAL SOCIETY.

The Calcutta Christian Observer, June, 1854.—BY THE EDITORS.

Journal of the Indian Archipelago, June to December, 1853.—BY THE EDITOR.

The Oriental Baptist, No. 90.—BY THE EDITOR.

The Oriental Christian Spectator for May, 1854.—BY THE EDITOR.

The Upadeshak, No. 90.—BY THE EDITOR.

The Tattwabodhiní Patriká, No. 130.—BY THE TATTWABODHINÍ SABHA'.

The Bibidhártha Sangraha, No. 26.—BY THE EDITOR.

The Citizen, for April and May.—BY THE EDITOR.

The Purnachandrodaya, for ditto.—BY THE EDITOR.

The Doorbeen, a Persian Newspaper, Nos. 1 to 6.—BY THE EDITOR.

*Exchanged.*

The London, Edinburgh, and Dublin Philosophical Magazine, No. 41.

The Athenæum, for February, 1854.

*Purchased.*

Ritter's Atlas von Asien.

Benfey's Christomathie aus Sanskritwerken, Zweites Theil.

The Annals and Magazine of Natural History, for February and March.

Robertson's Dictionary, English and Guzráti.

Comptes Rendus, Nos. 1 to 8, for 1854.

Cunningham's Bhilsah Topes.

Hooker's Himalayan Journals, 2 vols.

Asar us Sannadeed, 2nd edition, 2 copies.

Journal des Savants, for January and February, 1854.

RA'JENDRALÁ'L MITTREA.

June 7th, 1854.



## FOR JULY, 1854.

At a Meeting of the Society held on the 5th instant at half-past 8 P. M.

Sir James Colvile, Kt. President, in the chair.

The minutes of the last month's proceedings were read and confirmed.

Donations were received —

1. From the Government of Madras through Mr. Deputy Secretary J. Low, a report on the Madras Central Museum, for 1853.

2. From Captain Thuillier, a map of the Muttra district, in the Nagri character.

3. From J. Reid, Esq. Officiating Principal, Grant Medical College, a Report of the college, for the session 1853-54.

4. From J. Hill, Esq. an Australian Boomerang.

The following gentlemen duly proposed and seconded at the last meeting were balloted for, and elected ordinary members.

G. F. Edmonstone, Esq. C. S.

Hon'ble E. Drummond, C. S.

James Watson, Esq., C. S.

Captain James, 29th Regt. N. I.

Mr. W. Grapel was named for ballot at the next meeting;—proposed by Mr. Woodrow and seconded by the President.

The Council submitted a proposal, having for its object the nomination, for ballot at the next meeting, of Lieut.-Col. Cautley, F. R. S. F. G. S. as an honorary member.

The President announced to the meeting the death of Professor Jameson, an honorary member, and of Dr. Wallich, an old and distinguished member of the Society.

Communications were received—

1. From W. Muir, Esq. Secretary to the Government, N. W. P. enclosing a copy of the Meteorological Register kept at the Secretariat Office at Agra, for the month of May, 1854.

2. From Bábu Rádánáth Sikdár, abstracts of Meteorological Register taken at the Surveyor General's Office, Calcutta for the month of March, 1854.

The Secretary read an extract from a letter from Dr. Sprenger, dated Alexandria 3rd June, announcing the discovery of a MS. of the original work of Waqidy.

"I have met with a work of the veritable Waqidy: I do not mean Ibn Sád, the Secretary of Wáqidy, who died in 230, but Mohammad b. 'Omar b. Wáqid who was born in 130 and died in 207. Yes, my eyes have seen it and my fingers have touched it, and what is more, I secured it for the Bibliotheca Indica!

"The work is the *مغازي* or Military expeditions of the prophet. It has 392 pp. of 19 lines. The copy was written about A. H. 525 or sooner. It belongs to A von Kremer, Dragoman of the Austrian Consulate of Alexandria. He bought it at Damascus, and is anxious to edit it in the Bibliotheca Indica. It is, along with the conquests of Syria, edited by Lees, the most important work in the Arabic literature, infinitely more important than Tabary, being of the first period, and an original work; whereas Tabary is of the second—a compilation and abstract.

"I plead guilty to an error and abjure a heresy into which I have fallen in my life of Mohammad p. 71 note 3. If Ibn Qotabáh and other old authors quote Wáqidy, they mean the veritable Mohammad b. 'Omar, and not his secretary, as there stated.

"As the post will leave this in a quarter of an hour, I cannot give you an outline of the work itself, but the wars of Mohammad appear to be treated in it at three times as great a length as they are in any other known work. He gives us always his authorities and among them, it would appear in some instances written ones, as for instance, Abu Mahsar."

The Librarian submitted his usual monthly report.

#### LIBRARY.

The following accessions have been made to the Library since the last meeting.

#### *Presented.*

Selections from the Records of the Madras Government No. II. Report on the Central Museum.—BY THE MADRAS GOVERNMENT.

Madras Meteorological Observations, 1846—1850.—BY THE SAME.

Natuurkundig Tijdschrift voor Nederlandsch Indië, Deel VI. aflevering I. and II.—BY THE SOCIETY OF NATURALISTS OF NETHERLAND'S INDIA.

Lexicon Geographicum, cui titulus est مرادف الاطلاع بعلى اسماء الامم و البلدان و Septem Fasciculum, exhibentem leteras ج ad ن.—BY THE CURATORS OF THE ACADEMY OF LEYDEN.

Annual Report of the Grant Medical College, Bombay, 1853-4.—BY THE PRINCIPAL OF THE COLLEGE.

Journal of the Agri-Horticultural Society, Vol. VIII. p. V.—BY THE SOCIETY.

Proceedings of the Royal Society, Vol. VII. Nos. 1-11.

The Calcutta Christian Observer, for July, 1854.—BY THE EDITORS.

The Oriental Christian Spectator, for June, 1854.—BY THE EDITOR.

The Oriental Baptist, No. 81.—BY THE EDITOR.

The Upadeshak, No. 91.—BY THE EDITOR.

The Bibidhārtha Sangraha, No. 27.—BY THE EDITOR.

The Purnachandrodaya, for June, 1854.—BY THE EDITOR.

*Exchanged.*

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RA'JENDRALAL MITTRA.

*July 5th, 1854.*

# JOURNAL

OF THE

# ASIATIC SOCIETY.

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No. V.—1854.

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*A Sketch of the Mahomedan History of Cashmere.—By Lieut.  
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The native authorities consulted in drawing up the following brief sketch of Cashmere History are as follows :

1. The Raja Tarangini (Persian translation of Kalhana pundit carried on to the present day by later hands).
2. The History of Mahomed Azim.
3. The Ayeen Akbarie of Abul Fazl.
4. The History by Narrain Khol.
5. Ditto by Hyder Malik Chadwanee and several other less well known authorities.

It had been my intention to have commenced the following sketch with the fabulous desiccation of the valley by Káshyapa, anterior to historical times, as related in the earliest existing chronicle—the Raja Taringini, but as that work has been translated and is accessible to those who take an interest in the subject, I have taken up the history from the point where that ancient record ceases, a continuation of which in the Persian language has, as above remarked, been brought down to the present day.

It must be remarked, however, that according to one Mahomedan author (I will not say authority) the records of the valley extend to a date long anterior to the fabulous Hindu tradition of its desiccation by the Muni Kashypa, an event which, from coincidence in the chronology, seems to point to the Mosaic deluge. The author



above alluded to\* (Noor-ood-deen) begins his history of Cashmere with the creation, and according to him the valley was visited by Adam after the fall! The descendants of Seth reigned over Cashmere 1110 years, after which it was conquered by Hurrishunder Raja, whose descendants reigned till the deluge, after which event the country was peopled by a tribe from Turkisthan. Moses is said to have died in Cashmere, where he taught the worship of the one God. The people, however, afterwards relapsed into idolatry, a sin which was visited by the local inundation of the country and the tyranny of the demon Juldeo. After the desiccation of the valley by Kushef, fifty-five princes of the Korans reigned 1919 years. According to Bedia-ood-deen (the commentator of Noor-ood-deen,) the country was settled by Solomon, who set up his cousin Isaun as king. The worship of the one God still continued the national religion, till one of the kings lost his life in endeavouring to resist the progress of idolatry, which again gained a footing in the land, and from this time the brahminical faith seems, with one or two intervals of Buddhism, to have prevailed until about the period at which the present sketch commences.

1305 A. D.—About the year of the Hejira 705 Raja Sudeo ascended the throne of Cashmere, a prince of a tyrannical and feeble character, who, in a short time alienated the affections of his subjects by sundry acts of incapacity and oppression. At this period, a certain Mahomedan prince named Shahmir, who claimed a descent from Ali, assuming the disguise of a merchant's son, appeared in the country, and was assigned a village near Baramoola for his residence and support. Ambition seems to have prompted him to this, inasmuch as his grandfather Wuffoor Shah of Sawadgere had prophesied that Shahmir would one day become a king of Cashmere, which, it will hereafter appear, eventually came to pass; one amongst numerous instances of such prophecies containing the conditions of their own fulfilment.

Another chief named Sunkur Chukk, being driven away from Dardao, fled to Cashmere, and there took up his abode with his adherents; and thirdly, prince Ranjpoe, a son of king Yuftun of

\* These facts I derive from Professor Wilson's *Treatise*, Vol. XV. Trans. As. Soc. never having met with the work of Shaik Noor-ood-deen.

Thibet, being forced to fly his country, appeared in Cashmere, and attempted to gain over to his cause Ramchund the hereditary commander-in-chief of the army of Cashmere, which chief assigned to him his fort of Koknigera for his residence. It will be seen that these three worthies either in their own persons or in those of their descendants played conspicuous parts in the history of the country.

Towards the close of Raja Sudeo's reign a Turk, Zoolkudr Khan, invaded Cashmere with an army of 70,000 horse from Kashmirra by the Baramoola pass, upon which the cowardly Sudeo immediately fled to Kishtewar. The Turks then sacked the country, where they luxuriated in plenty for six months; after which, provisions failing, they attempted to return, but perished to a man in the snow above the Deosir Pergunnah: previous to this their numbers had been reduced by war and luxury to 50,000. On their departure, anarchy ensued in Cashmere for a time; parties of robbers and independent zemindars infested the country.

On the flight of the king to Kishtewar, Ramchund, the commander-in-chief, had retreated to his fort of Koknigera, where he held his own during the subjugation of the country by the Turks.

The Raja of Thibet, Ranjpoe, deeming this a favourable opportunity of gaining possession of the throne, introduced himself with a few followers in the disguise of merchants into Koknigera, and slew Ramchund, whose daughter Kotereen he married. He then seized the vacant throne of Cashmere, and made Rawanchund, his wife's brother, commander-in-chief, and despatched him to Thibet as viceroy of that country. The fugitive king Sudeo, seeing this state of things, now attempted to return, but, meeting with no encouragement from his former subjects, again fled to Kishtewar and finally vacated his throne after a reign of nineteen years, three months and twenty-five days.

A. D. 1323.—Ranjpoe or Rinshan Shah being now established on the throne, made the prince Shahmir minister, and, although he had raised himself to the dignity of king by an act of violence, seems, when once his power was secure, to have ruled with wisdom and justice, and many acts in which these qualities were exhibited are recorded of him. He appears also to have been troubled with

doubts respecting religion, and the Mahomedan writers relate the following story of his conversion to the religion of Islam. Perceiving the folly of idolatry, he prayed earnestly to God to afford him some guide in his search of truth; it was at length vouchsafed to his troubled mind that the religion of the person who should first meet his sight on arising in the morning was the one it was right for him to adopt. It so happened that the Fageer Boolbel Shah of Thibet, engaged at his morning prayers, was the first person upon whom his eyes fell. Struck with the sight he requested an explanation, became convinced and accepted the religion of Islam and assumed the name of Sudder-Udeen. Ramchund and many other nobles were converted at the same time.

It is proper to add that the Hindu writers entirely ignore the conversion of Ranjpoe who died after a reign of two and half years, leaving his widow the queen Kotereen, A. D. 1326, regent. This princess now raised to the throne and married Udeen Deo the brother of Sudeo, the issue of which marriage was one son. No sooner had this king mounted the throne than his country was invaded by an army of Turks who, under the command of Urdil, marched across the Pir Pinjal to Hurpore, upon which the timid Udeen Deo fled towards Thibet, but Kotereen with the courage of her race, rallied her forces around her, called in her brother Rawunchund, the commander-in-chief, and the wuzzeer prince Shahmir to her aid, by whose assistance, after several battles, she brought the Turks to terms. It was arranged that the latter should leave the country immediately and be allowed to retire unmolested. Their retreat being effected, the queen recalled Udeen Deo her timid consort, but his subjects, indignant at his desertion of them in the hour of danger, would never pay him the respect due to a sovereign. He died after a reign of fifteen years, leaving queen Kotereen a second time sole regent of the country. A. D. 1341, She now removed her court to the fort of Indr Kote, where she resided in peace for five months, but during this period the eyes of men were gradually turned towards prince Shahmir who had commenced a course of intrigue, the result of which was the merging of the whole real power of the state into his own hands. Still restrained by some scruples of conscience, he at first sent the Queen



proposals of marriage, which being rejected with scorn, he prepared to extort her consent by force of arms and invested Indr Kote with a large army. The heroic Rajpootnee made every effort to defend herself and sustain a siege, but at length, her brother Rawunchund being dead and finding herself unsupported and declining in power, she, in the last extremity, consented to espouse the successful usurper. Upon this, hostilities ceased, and preparations for the marriage were commenced, A. D. 1341, but the devoted princess despairing and indignant, surrounded by her train of maidens, rode slowly forth from the beleaguered fort, advanced into the presence of the usurper, and upbraiding him for his ingratitude and treachery, stabbed herself before him. Thus perished by her own hand the last Hindoo sovereign of Cashmere and Prince Shahmir ascended the throne as Sultan Shums-ood-deen.

#### *Independent Kings.*

Prince Shahmir, usually considered the 1st Mahomedan King of Cashmere, ascended the throne in the year of the Hejira 742, A. D. 1341, and assumed the name of Sultan Shums-ood-deen, but died after a short reign of three and half years. He was succeeded by his eldest son Jumshéd, A. D. 1344, who however after enjoying the throne for little more than a year, was defeated and slain by his younger brother Ala-ood-deen, who forthwith ascended the throne. Of this prince little is recorded except that he reigned in peace for twelve and a half years, and was succeeded by his son Shahab-ood-deen, A. D. 1356, who having repaired the devastations caused by the former invasions of the Turks, which had impoverished the country for the last few reigns, turned his attention to foreign conquest and during the succeeding ten years subdued A. D. 1350, Thibet, Kashgar, Budukshan and Cabul. He then, according to the historian Hyder Malek, with an immense army (of 50,000 horse and 500,000 foot) invaded Hindustan by way of Kishtewar and Nugger Kote, and is said to have worsted Firoz-shah, King of Delhi, in a pitched battle on the banks of the Sutlej, the result of which was to cause that potentate to acknowledge his supremacy. Shahab-ood-deen then returned to Cashmere, where his religious zeal led him to destroy the idol



temples at Bijbiharee and elsewhere, and it was probably under compulsion that the chief of the powerful tribe of Reyna, (Ajil Reyna of the Chunds of the Nargaon Pergunah,) at this time became a convert to the religion of Islam. Sultan Shahab-ood-deen died after a reign of nineteen years and was succeeded by his brother Kootub-ood-deen, A. D. 1376, who appointed Abdie Reyna commander-in-chief. During this reign, the famous Syud Allie Hamadanie arrived in Cashmere, and his advent is recorded in the following couplet which also contains the date, Hejira 790 (A. D. 1388.)

سال تاریخ مقدم او را جوئی از مقدم شرایف او سنه ۷۹۰

This celebrated Syud was a fugitive from his native city of Hamadan where he had incurred the wrath of Timoor. Seven hundred Syuds are said to have accompanied his flight to Cashmere, where he remained six years and which he named the "Garden of Solomon," (Bagh-i-Soliman.) He died at Puklie whilst on his return to Persia. His son Meer Mahomed Hamadanee, also a fugitive, brought in his train 300 Syuds to Cashmere, where he remained twelve years.

These two immigrations of fugitive Syuds fixed the religion of the country and were doubtless the chief cause of the religious persecutions which ensued in the following reign.

They established shrines all over the country, many of which remain to this day. They originated the sect of "Rishees" or hermits, which are described by Abul Fazl as a very respectable and inoffensive order, in his time some 2,000 in number, living upon fruits and berries and abstaining from sexual intercourse. Their numbers, however, afterwards declined until they became quite extinguished by the courtiers and creatures of the Emperors of Delhi.

Mahomed Azim the historian enumerates many worthies of this sect, a few of the most celebrated of whom I have added in a note, leaving the historian to be consulted in original by such readers as feel interest in the pretended miracles and holy acts of Mahomedan saints. Some of the stories, however, are sufficiently amusing.

To resume—Cashmere having been, previous to this influx of zealots, in a transition state as to religion, the advent of a Mahomedan

saint such as Syud Allie seems to have been hailed with enthusiasm, and proselytism to have commenced in real earnest. Meantime Kootub-ood-deen died after a reign of near sixteen and half years, A. D. 1393, and was succeeded by his son Sultan Sikunder, during whose reign a constant succession of learned doctors appeared in Cashmere, attracted doubtless by the fame of a new Mahomedan acquisition, A. D. 1397. At this time also (H. 800,) Timoor Lung invaded India, and presents passed between him and Sikunder. Preliminaries were arranged between their respective vakeels for a meeting near Attock, and Sikunder had actually set out, but Timoor had already passed on to Samarkand, taking with him a son of Sikunder as a hostage. Partly by the influence of Timoor and partly no doubt urged by the fanatic Moslems who had lately appeared in his country, Sikunder was about this period instigated to religious persecution; he began to throw down the Hindoo temples and images "by fire," and to force his subjects to abjure idolatry: he thereby acquired the surname of "Bhutshikan" or "Iconoclastes." It seems probable that he employed the agency of gunpowder, A. D. 1393, in his destruction of the temples, a present of which, it has been suggested by an author upon Cashmere Antiquities (Cunningham), he might have acquired from Timoor, as it appears established that the use of that explosive was known to the nations of central Asia in the 14th century. Sikunder died after a reign of twenty-five years, nine months, leaving the throne to his son Sultan Allie Shah, (1417) who inheriting to the full his father's fanaticism, but being without his energy and talents, after reigning six years and nine months, left the government in the hands of his brother Zein-ul-ab-ood-deen and set out on a pilgrimage to Mecca. On his arrival however at Jummo, he was dissuaded by his father-in-law, the Rajah of that place, from proceeding further and accordingly commenced his return to Cashmere by way of Pukli, A. D. 1423, but his brother refused to surrender the government, and a severe battle ensued in which the king was taken prisoner, confined, and soon after died, perhaps from poison.

A. D. 1423.—Zein-ul-ab-ood-deen or "Boodshah" now mounted the throne, and soon after invaded Kashgar and Thibet with an army of 100,000 foot and 20,000 horse.

This prince improved the country more than any of his predecessors. He built bridges, towns, and forts, (Zein Kuddul, Zein-pore, Zein Kote, &c.) and erected at Naoshera a noble palace (twelve stories high, each story of fifty rooms) : he constructed the Lank island, upon which he built a mosque and a summer-house (to be seen there to the present day) on the site of an ancient temple, whose summit was at that time visible above the waters of the Wuler Lake (1443) : he also enlarged and beautified the city of Srinugur his capital. This great prince encouraged literature and the fine arts ; he introduced into the country weavers from Turkisthan and wool from Thibet ; and many manufactures, such as paper-making, glass-making, book-binding, &c. owe their introduction in Cashmere to his fostering care. He was well versed in the literature of his age, acquired several languages and translated books. He collected a library and invited to his court learned men of all kinds—amongst others Jumal, a Hindustani, became “Kazi” of Cashmere, and a sort of inquisitor general into the religion of Islam. Zein-ul-ab-ood-deen was also a poet and added to his other qualities a love of field sports. The rising power of the Chukk tribe did not escape the penetrating eye of the king who prophesied, they would some day be rulers of Cashmere, a prediction which eventually proved correct.

Altogether Cashmere seems to have made a great step towards an improved civilization during the reign of this great prince, which extended over a period of fifty-two years. He died in 1474, and was succeeded by his son Hyder Shah, A. D. 1474, who after reigning little more than a year was killed by a fall from his palace, A. D. 1475, and was succeeded by his son Sultan Hussan, a prince of a very voluptuous and sensual character. Hitherto a tribute of twelve lakhs of rupees and a thousand horses had been exacted from the surrounding states, which, now encouraged by the king's indolence, asserted their own independence, and thus only Cashmere proper remained to him. However Tazie Khan, his commander-in-chief, invaded the Punjaub with a view of chastising the chief of that country, Tattar Khan, who had afforded aid to the rebels. This king Sultan Hussan reigned twelve years in excess and drunkenness, when he died leaving the throne to his



son Mahomed Shah a child of seven years of age, destined in after life to experience more of the vicissitudes of fortune than usually falls even to the lot of kings. Encouraged by the circumstances of the king's youth, A. D. 1487, (A. H. 893,) his uncle Futteh Shah, the brother of the late king, was tempted to aspire to the throne, and on the pretext of invading Hindustan, he managed to get the king's army under the commander-in-chief Mullick Saifdar out of the country, and during the temporary absence of the youthful king, who accompanied the army on the expedition, was appointed viceroy, and was on the point of throwing off his disguise when the sudden return of the king Mahomed Shah disconcerted his projects for the time.

After a short interval however he entered into a secret alliance with Sirung Reigna and Mullick Shums Chukk, chieftains of Cashmere, whose combined forces defeated the king's army under Mullick Saifdar, and forced Mahomed Shah to vacate the throne, after reigning two years and seven months. Futteh Shah thus obtained temporary possession of the throne and made Shums Chukk, commander-in-chief and minister, A. D. 1489. Thus things remained some two and half years, after which a party headed by Meer Syud, Ibrahim Magrey, Mullick Hadjie Padr, and Abdie Reigna, gradually brought together their adherents and defeated Shums-ood-deen Chukk, and his nephew Kajee Chukk, who fled to the Kamraj, where they took refuge in their strongholds, A. D. 1492.

Upon this Mahomed Shah regained his throne and Meer Syud Mahomed and Mullick Moosa Reigna became ministers. Mahomed Shah then followed the Chukks into the Kamraj as far as Sopur, and his army took and destroyed their stronghold of Taragaom. Determined on revenge, however, Shums Chukk still kept the field with a party of horse, and meditated a night attack upon the king who was encamped at Sopur; this project however coming to the king's knowledge, he ordered the bridge over the river Jhelum at that place to be destroyed, and preparations were made to receive the enemy. At the dead of night the Chukks, led by their brave chieftain, swam the river, and fell upon the king's camp. A sanguinary conflict ensued, which, notwithstanding all his efforts,



ended in the defeat of Shums Chukk, who was again forced to seek safety in his mountain fastnesses. Upon learning this disaster Futteh Shah fled to Hindustan, but soon afterwards returned on the invitation of his victorious nephew. Although thus generously forgiven, this old intriguer soon recommenced his former practices, formed a party and prevailed so far that Mahomed Shah, A. D. 1499, was a second time forced to abandon his capital, and take refuge with Mullick Moosa Reigna, who still held his own estates and maintained a desultory warfare.

Futteh Shah thus, a second time, gained possession of the throne, making his faithful adherent Shums-ood-deen Chukk minister; A. D. 1499, but his enjoyment of it was but brief: Moosa Reigna, rallying his forces, took the field and signally defeated the usurper's army in a pitched battle, taking his opponent Shums Chukk prisoner. So dangerous a rival could not be allowed to live, and accordingly the Chukk was put to death in his prison, after having, it is said, killed no less than sixty of his executioners before he fell, as is related in the following couplet well known in Cashmere legends.

بہنگ و بچوب و بخشش و بدمشت    ملک شمس چک شمت کس را بکشت

A. D. 1501.—Mahomed Shah being absent in the Punjaub, Futteh Shah was suffered by the successful Reigna, after some negotiation to retain the name of king, whilst he himself exercised its real powers for nearly nine years, until about the year 916 H., (A. D. 1510.) Futteh Shah, finding himself a mere puppet, attempted to set up Mullick Ibrahim Magrey in opposition, who however was soon forced to provide for his safety by flight. The tribe of the Dangrees now got the upper hand for the space of forty days, and set up Mullick Asman, but the Chukks, under Kajee Chukk, now aroused themselves and got the better of the Dangrees. A state of anarchy and scramble for power succeeded, in the midst of which Futteh Shah fled as far as Hurpore, on his way to Hindustan, but being there met by Ibrahim Magrey, who professed himself ready to stand by him, he was encouraged to return to the capital, and he reigned one year longer. At length the fugitive monarch Mahomed Shah determined on an effort to regain his throne, collected an army in the Punjaub, and marched, A. D. 1512, towards Cashmere by

the Pymouth, (now Paonch) road. A strong party in Cashmere also, at the head of which were Sunkur and Nusrut Reigna, declared for the legitimate king. Nevertheless Futteh Shah, being supported by Ibrahim Magrey and others, advanced into the Kamraj to meet the enemy; a great battle ensued at Poshkur, in which Futteh Shah was totally defeated, and fled to Hindustan; the two sons of his chief adherent Ibrahim Magrey were taken prisoners and his party broken.

A. D. 1512.—Mahomed Shah then mounted his throne for the third time, but was not permitted to reign in peace beyond nine months, inasmuch as Futteh Shah, who had been sufficiently dispirited by his defeat to remain quiet thus long, at length, regaining confidence, despatched his son Hubbeeb Khan (whose mother was of the Chukk tribe), to Cashmere, where he succeeded in forming a close alliance with the Chukks and other discontented parties, and as a preliminary, it was arranged that in the event of success, one-third of the country should be set apart for Kajee Chukk, one-third for Jehangire Padr, and the remainder for Sirung Reigna; Futteh Shah himself receiving a general tax from the whole. Upon this the pretender in person came to Cashmere and a battle ensued in the Bongil Pergunnah, in which Ibrahim Magrey (now a staunch supporter of the king Mahomed Shah) was killed, with his two sons; and the king's army totally defeated. Upon this Mahomed Shah, A. D. 1515, abandoned the country, fled to Hindustan, and solicited aid from Sikunder Khan Lodi, who granted him an auxiliary force of 30,000 horses, A. D. 1515, with which he marched towards Cashmere. Meantime Futteh Shah had assumed the government, but no sooner did the nobles of his party (Kajee Chukk, Jehangire Padr, Nusrut Reigna), &c. hear of the approach of Mahomed Shah, with such an overpowering force, than each sought to make his own terms and tendered his submission to the king, whereupon Futteh Shah fled for the fourth and last time, and Mahomed Shah preceding the bulk of his army, arrived in Cashmere with 2,000 light horse and mounted his throne for the fourth time, making Kajee Chukk his minister and throwing Sirung Reigna into prison. The latter, however, he soon after liberated, for we find in the year A. D. 1519, that chief together

with his former master Futteh Shah, died in exile amidst the mountains of Hind.

A. D. 1519.—It might have been now expected that, his rival being dead, Mahomed Shah would at length have been left in the peaceable enjoyment of his throne, but although indeed he continued to bear the title of king, he was a mere puppet in the hands of his ministers ; and his country from his last accession to the throne till his death in the year A. D. 1537, was the scene of incessant intestine struggles for power amongst those powerful nobles in whom rested the real power of the state. From this period until the subjugation of the country by the Emperors of Delhi, the history of Cashmere is little else than a record of the wars of the tribes of Chukk, Reigna, and Magrey, in which, the former two were chiefly at variance, the Chukks generally having the upper hand, and eventually a decided preponderance of power. To follow the details of these petty wars seems needless, and indeed the various historians of the period differ considerably from each other in their narration of events : The frequent mention also of various chiefs bearing similar names, renders it still more difficult to trace any consecutive history ; the following facts, however, may be shortly enumerated as occurring from about the time of Mahomed Shah's last accession to the throne in the year A. D. 1519.

Nusrut Reigna and Sohur Magrey were both killed in battle.

Kajee Chukk, the king's minister, quarrelled with his old ally Jehangire Padr, and forced him to fly the country : (in the year A. D. 1520.)

Mullick Abdie Reigna, and Sohur Magrey, brought prince Sikundar Khan, a son of Futteh Shah, with a large army from Hindustan ; Jehangire Padr and others joined them, and amongst them they set up Sikunder Khan for the throne, Kajee Chukk despatched his son Musood Chukk against them, (A. D. 1520,) who met them in the Lar Pergunnah, but was defeated and slain ; Prince Sikundar however finding the Chukks, as yet, too strong for him, retreated into the mountains. After this Kajee Chukk became so powerful that the king Mahomed Shah, becoming jealous of him, formed a party of Magreys in opposition, who, taking



him at unawares, forced him to fly to Naoshera, with his adherents: he was there met by another enemy, namely, an army of Turks who were advancing under the command of Shaik Allie with a view of invading Cashmere; these however he worsted and succeeded in effecting his escape from the country. He remained in exile some eight months, after which he contrived to make up matters with the king, who had begun to find his new supporters more troublesome than the Chukks. He accordingly returned, and, countenanced by the king, dispersed the Reignas and Magreys; the chief of the former he seized and the latter fled. (A. D. 1528.) Kajee Chukk now openly dethroned the king, who was driven into exile, and set up his own son Sultan Ibrahim. Encouraged by the want of unanimity amongst the nobles of Cashmere, the surrounding nations seem, at this period, to have been continually on the watch for opportunities of effecting its conquest, and several armies of these nations at different times, actually entered the country and took part in its intestine struggles.

The Magreys allied themselves to Allie Beg, who brought 20,000 horse, and their combined forces met Kajee Chukk in the Bongil Pergunnah; that chief behaved with his accustomed bravery, (A. D. 1528,) but many of his family having fallen or been taken prisoners, he at length reluctantly left the field. The Magreys then got the upper hand and Allie Beg returned to the Punjaub. Encouraged by the internal weakness of the country, the surrounding tributary states now also began openly to revolt, and in the year (H. 937,) 1530 A. D. Mirza Kamran Chogatai instigated by his brother, (A. D. 1530,) the Emperor Humaioon, who that year ascended the throne of Delhi, and who until his attention was distracted by his own troubles, seems to have had his eyes on Cashmere (the ancient national chronicle of which country the "Raj Taringini" was first translated by his orders) advanced with an army of 30,000 horse as far as Naosherah. The danger being imminent, the nobles in power turned their eyes on their former enemy, the brave and wise Kajee Chukk, (A. D. 1530—7,) whom they solicited to return and fight for the common cause. He accordingly joined them, and the allied forces of Cashmere, signally defeated the army of Mirza Kamran in a pitched battle near the



city of Srinugger. Soon after this, Syud Khan with an army of Kashgurries, and Mirza Hyder with 14,000 horse invaded Cashmere by the Lar Pergunnah ; the Cashmeries being unable to give battle, took to the hills, but during the winter made some head against the invaders ; and although in one affair alone they lost 1,600 men, they succeeded in bringing them to terms. It was stipulated that Sikunder Khan Kashgurrie should marry a daughter of the exiled king Mahomed Shah who was himself married to a sister of Kajee Chukk, who was thus uncle to that Princess : upon this the Kashgurries left the country.

The king Mahomed Shah died in exile in the year H. 944, and was nominally succeeded, successively, by his eldest son Shums-ood-deen Shah, who reigned for one year, (A. D. 1537,) and by his second son Ismaul Shah who married a daughter of Kajee Chukk, the actual ruler of the country. At length Kajee Chukk, feeling jealous of the Magreys, made war on them, but being worsted, was forced to take to the mountains : the return of Reygie Chukk however from Jummoo soon enabled him again to take the field : a general rally of the Chukks ensued, which led to the defeat and dispersion of the Magreys, whose power being thus effectually broken, Kajee Chukk ruled in peace for three years, and, as far as the distracted state of the country admitted, turned his attention to its improvement and to the administration of justice. It was not, however, fated that he should longer retain the throne he had so hardly won.

A. D. 1540.—In the year of Hejira 947, his kinsman Reygie Chukk and Abdal Magrey, entering into an alliance, called in the aid of Mirza Hyder, a foster brother and faithful adherent of the Emperor Humaioon (A. D. 1540). That chief, under the stipulation he should enjoy the real powers of sovereign, consented to set up Tarkh Shah, a boy, son of the usurper Futteh Shah, (see page 416 et seq) as king of Cashmere ; and advanced with a considerable army. Kajee Chukk being alarmed, entered into an alliance with Shere Khan\* Affghan, then in rebellion against Humaioon, and gave him his niece (a daughter of Mahomed Shah) in marriage.

(\* Afterwards Shere Shah.)

A battle ensued, in which, however, Kajee Chukk was defeated, and fled across the Pir Pinjal as far as Thannah, where he died. He is related to have been of a kind and merciful disposition, and, except in battle, never to have shed the blood of his enemies. I may here remark that mercy towards the vanquished appears to have been (with a few exceptions) a characteristic of the gallant tribes which so long withstood the invasions of surrounding enemies, and at length, only succumbed to the weakness arising from intestine dissensions, and the fatal error of calling in foreign aid.

A. D. 1540.—Mirza Hyder, being now established, made Abdah Reigna his commander-in-chief, but coined in the name of Tarkh Shah. He was in power ten years; he set to work to clear the country of the powerful nobles, many of whom he put to death or banished. Reygie Chukk paid the penalty of his rashness in calling in a foreign ally, being forced to fly the country. Soon after the accession to power of Mirza Hyder, his patron, the Emperor Humaioon being forced to fly to Persia, (A. D. 1542,) the usurper Shere Shah ascended the throne of Delhi; the same year also, during the misfortunes of his father, was born in exile the future Emperor Akbar, destined at no very distant period to exercise dominion over the fair province of Cashmere, (A. D. 1540—51,) the brightest jewel of his crown. Left to his own resources, Mirza Hyder turned his attention to alliances with the surrounding states, always hostile to the influence of Cashmere, and ready to side with any invader against that country; he introduced armies of those nations, especially Kashgurries, with a view of securing a counterbalance to the power of the native nobles, who, for a time, being helpless, acquiesced in this state of things.

A. D. 1551.—At length a party of the Cashmere nobles, (Hussan Magrey, Quaja Heigie, Abdie Reigna, and others) entered into a conspiracy, having for its object the defeat and dispersion of the foreign armies in detail. With this view in the character of confidential advisers, they persuaded Mirza Hyder to detach his forces to the frontiers, and selected Dowlut Chukk to accompany the principal army consisting of Kashgurries. No sooner was this effected than Dowlut Chukk, instructed in the part he was to play, seized the person of the commander of the Kash-

gurrie army (a nephew of Mirza Hyder) and communicated this success to the other conspirators, who immediately threw off their disguise and fell upon the army of that chief, (now without a leader), and the other detached forces, all of which they defeated; and then, combining their own army, boldly advanced to give battle to Mirza Hyder himself.

A. D. 1551.—He, however, having placed his family and treasure in the Fort of Indrakoul, resolved upon making a night attack upon the rebellious nobles; with this view he, one day, went out alone to reconnoitre the enemy's position and, ascending a tree for that purpose, was there discovered and slain by one of the hostile spearmen (a butcher) who on challenging him, detected his foreign accent.

Thus perished (H. 959) the intrusive governor, who however had done much for the country during his term of power, having introduced many artisans and manufacturers. The conquerors spared all his family, who retired to Hindustan.

Abdie Reigna now came into power for a short time, but the Chukks under the leadership of the three sons of Kajee Chukk, (Gazie Khan, Hussein Khan, and Allie Khan,) rallied their forces, and drove away Abdie Reigna, (A. D. 1552,) who fled towards Hindustan, but his foot being caught by the branch of a vine on the road, he was dragged off his horse and killed by the fall, having enjoyed the supreme authority one year. The Chukks, having now the upper hand, made Hubbeeb Khan (son of the famous Shums-ood-deen Chukk) ruler of Cashmere, with Dowlut Chukk for his commander-in-chief. At this time a great earthquake occurred, which lasted seven days and destroyed many of the principal buildings, and considerably altered the channel of the river Jhelum; in fact it was during this earthquake, that the course of the river Jhelum, being turned, produced that change in the relative positions of the two cities of Hussanpoora and Hussainpoora, which the superstition of the Mahomedans has magnified into a miracle well known in Cashmere legends.

Dowlut Chukk, the commander-in-chief, at this time married the widow of his uncle Kajee Chukk: enraged at this proceeding her eldest son Gazie Khan, having caught him off his guard, seized



him and put his eyes out. Many stories are related of the prowess and gigantic strength of this brave chief, amongst others of his shooting an arrow two koss; to this day it is said the pillars raised to commemorate the deed are to be seen; he is also said, whilst at the court of Delhi, to have arrested the progress of an elephant by seizing the animal's tail! There is doubtless exaggeration here, but the Chukk tribe generally seem to have been endowed with a physique beyond the ordinary run of men, and, as before stated, (page 420). Cashmere superstition attributed their extraordinary strength and stature to a supposed descent from a "serpent god."

As before related, Hubbeeb Khan (A. D. 1552,) was at this time king of Cashmere, but appears to have been a man of little capacity.

Gazie Khan gradually acquired popularity, till at length the king, having one day disgusted all present by some act of folly in open Court, his crown was snatched from his head by Allie Khan, brother of Gazie Khan, to whom Allie presented it; and, that chief being hailed as king with acclamation, Hubbeeb Khan was forced to resign power. During this reign, notwithstanding the king's feeble character, many of the tributary provinces which had been wrested from the crown of Cashmere, were recovered by his armies. Meantime the blinded Dowlut Chukk, together with the chiefs of the tribe of Reigna, had proceeded to Delhi, A. D. 1555, to crave the assistance of the Emperor Humaioon who had lately regained his throne and was then at that city. He, however, happened to be killed the very day of their arrival by a fall from his palace wall. Thus disappointed, the Reigna entered into an alliance with a certain Ameer of Kashgur, who was at this time at the court of Delhi, and with his aid raised an army for the invasion of Cashmere; with that purpose, advancing as far as Kuspa, there encountered the enemy. A great battle ensued, which lasted two days; the first day's fighting, although indecisive, was so far favourable to the Chukks, that the Reigna considered it proper to send his ally off the field, but he himself renewed the battle the following day; he was however taken prisoner, and put to death by the victorious Gazie Khan: 4,000 men were killed on both sides in this battle.

Two years after this battle the king put down (A. D. 1557,)



another revolt, having for its object the restoration to the throne of Hubbeeb Khan, in which the latter was killed by an elephant.

After this, his possession of the throne was again disturbed by a nephew of Mirza Hyder, who invaded Cashmere with an army of 12,000 Moguls from Kashgur. The Cashmere army headed by the king in person advanced to Lohar Kote to meet them: upon the eve of battle Gazie Khan promised an ashrafee (about 16 Rs.) for every head of an enemy: A battle ensued in which the king was completely victorious, and 7,000 heads of the enemy were presented to him after the engagement: he is said to have exceeded his promise and to have disbursed two ashrafees per head.

A. D. 1557.—This prince seems to have been a just, but a very stern ruler, and it is related of him that he put to death his own son for having, in a fit of passion, killed his uncle, who had carried him an order from the king his father to appear at Court, which the fiery youth resented; he is said however to have exhibited remorse so far that he ever afterwards turned away his head when he happened to pass near the spot of execution. This able and energetic prince was also a poet and portioned out his time like our own Alfred. After reigning 9 years and 9 months, feeling the approach of old age, he abdicated the throne in favour of his second brother Hussain Khan, (H. 970,) A. D. 1562, who reigned in peace for five years; after which period however his (bastard) brother Sushkur Khan rebelled, and a battle took place at Kuspa (thus a second time the scene of a fierce engagement) in which the rebel chief was wounded and his army dispersed. Shortly after this event the king's little son Ibrahim Khan died of the small-pox, and the king himself was so struck with grief that he pined away and, five months afterwards, died. Hussain Shah (A. D. 1570) was succeeded by the third brother Allie Shah. At this time the descendants of Zein-ul-ab-ood-deen made some head and advanced as far as Neosherah, upon which Allie Shah despatched his nephew Lohur Khan with 5,000 horse against them, who defeated them by a stratagem. The king also put down a rebellion in Kishtewar. During this king's reign, there was a great famine which lasted for three years, arising from excessive falls of snow; during the two first years of this calamity the king expended

his entire revenue and private property on the relief of the people, which resources at length failing, he ordered his nobles to contribute their share to the public necessity. On enquiring of a noted fuqueer into the reason of the continued snow, he was told in reply that it would only cease on his death, which in fact took place from a fall from his horse within the year. He reigned ten years and was succeeded by his son Yoosuf Khan. (H. 988,) A. D. 1580.

Soon after the accession of this king a rebellion was headed by his uncle, who however was slain in battle and the revolt suppressed. The king's proud and overbearing character soon alienated the hearts of his nobles, who formed a conspiracy against him : some fighting occurred near the city on the plain near the Eedgurh, in which 300 in all, fell on both sides ; the same night, however, the king sent his crown to his minister and commander-in-chief Syud Mobarruck and retired to the hills of Hind.

Syud Mobarruk after ruling two months, finding himself opposed by the nobles, in his turn resigned the crown in favour of Lohur Khan, (A. D. 1580,) who proved a very just and good ruler.

In his time, adds our chronicle, there was such a plenteous season that rice sold for two maunds a "pice!" Yoosuf Shah now applied to the Emperor Akbar for assistance to enable him to recover his kingdom, but, the Emperor hesitating to forward his views, he went to Lahore and there raised a small force, at the head of which he marched towards Cashmere, in hopes of being joined by others who still adhered to his interests in that kingdom ; nor was he mistaken. On his arrival at Neosherah many nobles joined him with their followers, and thus re-inforced he gave battle at that place, which action, although indecisive, gained him some advantage ; he then advanced to Rajawer, the Rajah of which place joined him with his forces, and several more Cashmere chiefs came over to him with their adherents : meantime Lohur Khan, with the bulk of his army was at Hurpore, (A. D. 1581,) awaiting the enemy's approach, and now endeavoured to out-manceuvre him by a rapid march to Baramoola ( ? Barumgulla). Yoosuf Shah, however, marched to his flank, crossed the Pir Pinjal by an intermediate pass

(of Firozepore) and got to Lohur betwixt him and the Capital, where he received additional reinforcements from the Kamraj. Lohur Khan however immediately made a forced march with 12,000 horse and 25,000 foot and endeavoured to turn his position.

After some manœuvring Yoosuf Khan left the armies in position against each other, and proceeded to the capital by water, defeating a party of the enemy who endeavoured to oppose his entry. He immediately took possession of the throne, distributing presents and shewing himself publicly to the people, (A. D. 1582.) On hearing of this proceeding Lohur Khan followed his rival to the city, where finding himself unsupported by popular feeling he concealed himself in the house of Kasi Moosa, but was soon discovered and brought before Yoosuf Shah who put his eyes out.

Yoosuf Shah, being thus again established on the throne, abandoned himself to voluptuous enjoyments. Displeased with his course of life, and seeking doubtless, for a pretext for invading the beautiful province of Cashmere, the Emperor Akbar summoned him to appear at the imperial court. He was at first inclined to resist this assumption of authority, but complied so far with the Emperor's orders, as to send his younger son Mirza Hyder in his stead, but upon Akbar's threatening "to tread Cashmere under foot of horses," (literally), he despatched his eldest son Yakoob Khan (A. D. 1582,) with magnificent presents to deprecate his wrath. About two years after this, it happened that the Emperor Akbar was engaged in a war with Rajah Neelkunt, against whom he was about to despatch an army, when Yakoob Khan, who, up to this time had remained at court, requested to be allowed to undertake alone the adventure of capturing this person, which he in fact achieved by seizing the Rajah whilst bathing in the midst of his camp, and dashing away with him, with a few followers mounted on fleet horses. He was however but ill rewarded for this service, being confined by the Emperor on the plea of his being insane, and, indeed, he seems to have been of a wild unsettled character and likely to cause trouble. He however soon after effected his escape and returned to Cashmere with the Emperor's consent. Akbar now summoned the king Yoosuf Shah (A. D. 1584) to present himself in person at his court, then at Lahore. The nobles, however,



refused to allow him to leave the country, although he himself, alarmed at the near proximity of the Emperor, expressed his readiness to comply, and even went so far as to imprison his son Yakoob Khan. Seeing this state of things, the Emperor despatched an army of 50,000 men under Bugwan Dass to enforce compliance. That leader experienced a check near Attok, but Yoosuf Shah, fearing the ultimate consequences, secretly withdrew from his own army and delivered himself up to Akbar's general, who sent him under an escort to Lahore, where Akbar delivered him over to the custody of his police minister Todar Mull, who kept him under surveillance at that city for upwards of two years, (A. D. 1585,) after which he was sent in command of 500 horse in company with Rajah Maun Sing to Bengal, where he died of grief and despair (1587). On the flight of Yoosuf Shah his army called upon his son Yakoob Khan to lead them. A second battle ensued, in which the Emperor's army was defeated with the loss of 3,000 men, and was afterwards reduced to such stress amongst the mountains of Hoozara, from cold and want of food, that they are said only to have sustained life by slaughtering their elephants and sleeping within their still warm bodies. The imperial army being thus repulsed, Yakoob Shah (A. D. 1585,) ascended the throne of Cashmere over which he reigned one and half years. Although of a bravery approaching to recklessness (a quality which usually commands the respect of men) this prince was possessed but of little judgment and unfit to rule. He was also of the Shiah sect of Mahomedans, the Soonee sect being the predominant one in Cashmere, which circumstances combined to render him obnoxious to his nobles, a party of whom headed by Shums-ood-deen Chukk, Alumgire, Magrey, Allie Dar, and Hussan Mullick broke into open revolt and a struggle, which lasted seven (7) days, ensued in the capital city of Srinugger, but neither party being victorious, a conference took place and the Kamraj was guaranteed to the nobles. The truce was however soon broken through, owing to the insolence of the Shiah priests, and hostilities recommenced, which ended in the rebel nobles being forced to retreat to the mountains of the Kohihama. The Shiah priests, who seem to have possessed great influence over the king's mind, now instigated Yakoob Shah to still



greater outrages (A. D. 1585,) against the rival sect of Soonees, whom he compelled to call aloud the Shiah confession of faith ( *على ولي الله* ) to their great scandal. The Kazi of the city refusing to do this, they put him to death by tying him to the tail of an elephant, and in that manner dragging him through the city. The Soonee historians relate, that on this occasion, such a noise thundered from the surrounding mountains, that several ladies of the king's zenana, who were near their time, became mothers on a sudden.

This act of cruelty and oppression determined the Emperor Akbar to subjugate the country, and accordingly he despatched an army of 30,000 horse under his admiral Kasim Khan and the fugitive Hyder Chukk, who entered Cashmere by the Hurpore pass. Nothing daunted, Yakoob Shah, though with an inferior army, marched to engage the enemy, and drew out his forces in order of battle, but being at this crisis deserted by his nobles, (A. D. 1586,) he was forced to fly across the mountains to Kishtewar with an escort of 60 horse. Kasim Khan now obtained possession of the capital, (A. D. 1586,) but soon after jealous of the respect paid to his colleague Hyder Chukk by the native Cashmeries, imprisoned him. Yakoob Shah however was by no means of a disposition to surrender his country without a struggle; he rallied round his standard a few gallant spirits, advanced from Kishtewar, and after several desperate actions with detachments of the Emperor's army, in which he was generally successful, he made a rapid march and suddenly appeared on the hill of the Takt-i-Soliman overlooking the city of Srinugger, where he pitched his camp.

Kasim Khan now attacked him with his whole army, and a desperate conflict took place in which Yakoob Shah (A. D. 1586,) although worsted with the loss of his commander-in-chief Shums-ood-deen Chukk and many other of his principal adherents, still retained his position.

The Chukks now determined to make one desperate effort for the independence of their country, and rallied round the brave Yakoob Shah who still sternly held his ground on the Takt-i-Soliman. This gallant tribe, now a mere handful of men, fell with inconceivable fury upon the Emperor's army, and fairly drove it into the city,

where the soldiers took refuge in the palace, fort and other strongholds, where they remained in a state of siege.

The Emperor, finding his army insufficient to reduce the country, reinforced it with 20,000 horse under Mirza Yoosuf Khan. Upon the approach of this force, Yakoob Shah (A. D. 1587,) despatched Lohur Chukk to defend the passes, who however, being far outnumbered, was unable to offer any serious opposition to the enemy's advance.

In consequence, Yakoob Shah was a second time forced to retreat to Kishtewar, and Yoosuf Khan superseding the admiral, became governor of Cashmere and rewarded his allies with grants of money and land. (A. D. 1587).

The Emperor Akbar now announced his intention of visiting his newly acquired province, and accordingly the following spring proceeded by the Pir Pinjal. The governor Yoosuf Khan went forward as far as Barungulla to make his salutations, and conducted his sovereign with due state to Cashmere, which may be considered from this date to have passed from the hands of its ancient rulers under the sway of the Guznivide throne.

The native historians indeed date the ascendancy of the power of Delhi from the (A. D. 1588) arrival of Kasim Khan (Hej. 995) 1586 A. D. who always appears first in their lists of Soobahdars. The country cannot, however, be said to have been totally reduced to the condition of a province until the year 1592, inasmuch as large bands of the Chukks hovered in the mountains taking advantage of every opportunity of disturbing the intrusive governors, who from this time were periodically appointed from Delhi, nor indeed was it till the time of Etekaad Khan (1622) who hunted down the Chukks and put them to death as robbers and outlaws, that this fierce tribe was totally subdued.

After viewing the country, Akbar returned towards Cabul by Puklee, where Yakoob Shah, upon his safety being guaranteed, presented himself before the Emperor.

A. D. 1588.—No sooner however, had Akbar departed, than the governor, being opposed by the native nobles, was reduced to such stress that he applied to Delhi for re-inforcements, but their arrival being delayed by the snows of winter, which at that season render the

passes impracticable, Mirza Yardgar, a noble, proclaimed himself king and besieged the governor in the city of Srinugger. The Emperor however, on the opening of the season, sent a picked army against him under the command of Shaick-Furreed-Bukshee. On its approach towards the relief of the city of Srinugger, whilst hesitating to engage so superior a force, Mirza Yardgar was treacherously murdered by Sharock-Beg and Ibrahim-Kakur, who presented his head to the Emperor's general.

A. D. 1592.—The Emperor himself now followed in person and was received with every demonstration of joy by the Cashmeries. Being spring, he remained in the valley during the entire summer, but on the approach of winter returned to his capital, leaving Mahomed-Koolie-Khan as Soobadar, with Todar Mull to assist him in reducing the country to order.

As we now find Cashmere (although disturbed by the incursions of the Chukk tribe, who still wandered unsubdued in the hills) reduced to the condition of a province of the Guznivide throne, it seems a proper point to close this portion of its history.

#### PART 3RD.—*Cashmere under the Emperors of Delhi.*

A. D. 1586.—The native historians of this period, with the exception of Abul Fazl, agree in their arrangement of considering Cashmere to have passed out of the hands of its ancient rulers, and to have become an integral portion of the empire of Delhi from the year A. D. 1586, (H. 995,) in which date, we have seen Kasim Khan obtained possession of the city of Srinugger. Abul Fazl however closes the first portion of his history with the flight of Kajee Chukk to Hindustan (H. 947,) in the 1540, and the establishment of Mirza Hyder on the throne of Cashmere, which thus, according to him, passed under the sway of Humaioon Emperor of Delhi, but as that chief was soon dispossessed of his throne and slain, and as after him several native princes reigned for short periods, it does not seem advisable to follow his arrangement on this point, which was no doubt adopted with a view of flattering his Emperor and patron Akbar.

The second portion of his history moreover commences with the visit of Akbar to Cashmere. (1587.)



We have seen also that in the year 1587 A. D., the admiral Kasim Khan was relieved by Yoosuf Khan the 2nd Soobadar, who, after being in power five years, was in his turn succeeded by Mahomed Koolie Khan on the departure of Akbar in the year 1592 A. D., with which event also we closed our last chapter. (A. D. 1592.)

There is some discrepency of dates amongst the several authorities about this period, some historians giving six years, and others eleven years, as the term of Koolie Khan's government. Abul Fazal also records a third visit of the Emperor Akbar to the valley, and he is probably correct; but in general the accounts of the various Emperors' visits to Cashmere are singularly curt and void of interest; indeed it seems to have been reserved for an European (Bernier) who long afterwards visited the valley in the train of the Emperor Aurungzebe, to give any thing approaching a graphic account of the pageantry we may suppose to have accompanied their progresses. Of the several governors also little more is recorded than their names, dates of appointment, and terms of government. The following few facts, however, derived from various sources, appear to have taken place and may be briefly recorded.

A. D. 1592.—As before mentioned (page 432.) Todar Mull, the celebrated police minister of Akbar, was entrusted under the Soobadar Mahomed Koolie Khan, with the task of bringing the country into a proper state of subjection.

It was therefore, probably at his recommendation that the fort of the Harrieparbut or (to use the Mahomedan name) the Koh-i-Maran was constructed, with a view of overawing the capital. It was finished about the year 1597, A. D. at a cost of £1,100,000. Means were at the same time adopted of rendering the native Cashmerians less warlike, and of breaking their old independent spirit. Amongst other measures to effect this, I have been informed (but have nowhere seen it recorded) as a fact very generally believed in Cashmere, that the Emperor Akbar caused a change to be introduced in the dress of the people.

In place of the ancient well-girdled tunic adapted to activity and exercise, the Emperor substituted the effeminate long gown of the present day, a change which led to the introduction of the enervating *kangni* corresponding with the French *Chauve-chemise* or



pot of charcoal fire; without which a modern Cashmeree is seldom seen, A. D. 1597. And it is possible, that this measure, one out of a long series of acts of systematic tyranny and spirit-breaking oppression, may have had its effect in changing the character of this once brave and warlike race; for at the present day although remarkable for physical strength, the natives of Cashmere are totally wanting in all those qualities for which they were formerly distinguished. Whilst, however, thus carrying out the severe policy suggested by his minister as regards the inhabitants, it must not be supposed that the beneficent Akbar neglected the improvement of his fairest province; on the contrary, in addition to his acts for the amelioration of the condition of the ryots, he appears to have done much towards the embellishment of the country, which he adorned with palaces and gardens, and beautified by the introduction and cultivation of various trees and shrubs.

A. D. 1600.—He erected at an expense of £340,000 (thirty-four lakhs of rupees) the noble palace of Nagur Nagur below the Harri-parbut, of which however, scarcely a trace exists; and the celebrated Poplar Walk (which remains to this day a memorial of his taste) attests his magnificence.

He introduced an improved breed of large horses, as before his time the country only contained ghoonts and yaboos.

Our chronicle records cherries as owing their introduction into the valley to Akbar; this fruit, being in small quantities, has always been considered royal property in Cashmere, and was afterwards named (شاه‌آلو) “king apples” by Jehangire.

He commenced many other works of public utility, which his successors completed.

The East India Company was founded in 1600.—It was perhaps about the beginning of the 17th century that the Emperor visited his province of Cashmere for the third and last time, about which period also, a power was organized in a far distant land, destined, before two centuries had set, to exercise dominion over the magnificent Empire which then called him master; of all his provinces the fair valley of Cashmere being now nearly alone in its independence of that beneficent rule. Under Akbar Kabool and the intervening countries (Puklie, Bhimber, Sewad, Bijore, Kanda-

har, Zabulistan) were incorporated with the Soobah of Cashmere, and its annual revenue may be estimated a little short of one million sterling. (See Appendix). The standing army of the whole was 94,800 horse, and there were 37 garrisoned forts in various parts of the country, containing 2,400 foot or artillery. In the year 1604, A. D. Nawab Koolinj Khan was despatched from Delhi as Soobahdar of the country, but owing to the death of the Emperor Akbar, which took place in the succeeding year, (1014 H.) he only remained one year, during which a severe famine occurred. Akbar, dying at the age of 64 after a reign of fifty-two years, was succeeded by his son Selim, (A. D. 1605,) who assumed the name of Jehangire and the following year appointed Mirza Allie Akbar viceroy; (A. D. 1606,) but it seems doubtful whether this Soobahdar ever exercised power in his proper person; in fact according to the historian Hyder Mullick (who, however, it must be confessed is not generally to be trusted where the history touches his own times) the viceroyalty of Cashmere was at this time exercised by Hyder Mullick (himself) and Allie Mullick (his brother) nobles of Cashmere, and he omits the two last named Soobahdars from his list altogether; the former indeed is omitted in several lists I have met with. The same author relates that in the year H. 1015, (1606 A. D.) Kootub-ood-deen Khan and other Mogul Koti chiefs made an attempt to dispossess Yoosuf Khan, (?) but were defeated; perhaps the system of Naibs had already commenced. Mirza Allie Akbar, after a power of four years (whether exercised personally or not) was succeeded successively by Hashim Khan (A. D. 1610,) for three years by Nawab Safdar Khan (A. D. 1613,) for two years, and by Ahmed Beg Khan (A. D. 1615,) for three years, during whose tenures of office no event of importance occurred. At length Dilawer Khan (A. D. 1617,) became governor of Cashmere, and shortly afterwards reduced Kishtewar to its allegiance; the Mullicks of Shahabad being his allies and advisers (Hyder Mullick). During the time of this Soobahdar, the country was visited by a pestilence, and shortly afterwards the great mosque or Jumma Musjid, built by Sikunder Butshikan, together with 12,000 houses in the city were consumed by fire. The father of the historian Hyder Mullick (who was of the Shiah sect) was accused of having

been concerned in the conflagration, and, at the instigation of Noor Jehan Begum, he was compelled to rebuild it at his own expense. It had been twice partially destroyed by fire before, and rebuilt, once by Hussan Shah, and again by Ibrahim Magrey.

A. D. 1619.—The Emperor Jehangire, urged thereto by Hyder Mullick (if we may believe the historian's own assertion), now determined upon visiting Cashmere, and was conducted by the Pynwutch (now Poonch) road under guidance of Mullick Hyder Rais-ul-moolk-chogatai (to give him his full titles). This noble afterwards became a protégé and confidant of Noor Jehan Begum, and conducted many works of improvement and utility. Cashmere having been surveyed and reduced to order in the time of the Emperor Akbar, having also been beautified with palaces and gardens, little else remained for his son and successor, the magnificent Jehangire, than to enjoy the delights of this eastern paradise, in company with his empress, the peerless Noor Mahal whose romantic spirit appears to have led her lord and emperor to roam into the most secluded and picturesque recesses of the valley, many of which pleasant retreats, are to this day pointed out as the spots where the royal pair were wont to disport themselves in those days of regal abandon.

A. D. 1621.—Again in the summer of 1621 the emperor honored the valley with a visit for the second time. A successor had the previous year been appointed to Dilawer Khan, in the person of Iradut Khan, who is said to have built a beautiful palace for the emperor at Naopoor, and afterwards chopped off the Master Mason's hand to prevent his again executing a similar work of art: he however conferred on him great wealth as a compensation for his loss. After being in power two years, he was succeeded in 1622 by Nawab Etekaad Khan, a cruel governor, who commenced a systematic destruction of the Chukks, whom he hunted down and put to death. Bands of this fierce tribe still infested the surrounding hills, especially the range to the north of Cashmere, from which strongholds they issued on their predatory excursions. This crusade had the effect of almost exterminating that ill-fated tribe, the descendants of which at the present day, are the professional horse-keepers of the valley, and in their character, still in some degree display remnants of that ancient independent spirit, which led to their destruction.



A. D. 1624.—The highways being somewhat cleared of these turbulent spirits, Jehangire again paid a visit to Cashmere in the summer of 1624 A. D. and built many palaces and summer-houses, more especially he completed the construction of the celebrated Shalimar gardens immortalized by poets and travellers. The Naseem (or salubrious) and Nishat Baghs was the fancy of Noor Jehan Begum, to whose taste also many other beautiful retreats owed their origin. The ruins of palaces at Manasbul, Echibul, Virnag, &c. attest her taste in selecting picturesque sites.

Three years after this the emperor visited Cashmere for the 4th and last time, (A. D. 1627,) (or according to Mohammad Azim for the 7th) but on his return towards Hindustan, died at Rajawer, whence his body was conveyed to Lahore and there buried. His widow Noor Jehan Begum, took up her residence at Lahore after Jehangire's death, where she employed her leisure for the remaining twenty years of her life in constructing a magnificent tomb for her late lord and emperor. زینت شرع ۱۰۳۷

Shah Jehan succeeded to the empire of Delhi in the year A. D. 1627, but Etekaad Khan still remained viceroy of Cashmere, notwithstanding that the people of that country, groaning under his tyranny and exactions, despatched an embassy to complain of his oppression to the new emperor.

At length in 1633 A. D. Zufr Khan was appointed to succeed him, and the following year the emperor paid a visit to the valley in person, where he amused himself with sporting and planting gardens; amongst others he built the beautiful summer-house in the Shalimar gardens. The emperor again visited the country whilst Zufr Khan was governor, who also improved the country much, and introduced fruit trees and flowers, from Kabool. He did not confine his supervision moreover to embellishment, but invaded Thibet, and took the fort (Ladak) thereof which he annexed to the Soobahdarie of Cashmere. In his time religious disturbances betwixt the rival sects of Shiahs and Soonees took place.

In the year A. D. 1640, Prince Morad Buksh of Delhi visited Cashmere, and married a daughter of the Mullicks of Shahabad: he ruled the country for one year, and upon his departure (A. D. 1642,) Allie Murdan Khan was sent as Soobahdar, but was



relieved the following year by the emperor's favourite Zufr Khan (second time) who remained in power four years, during which period Shah Jehan (A. D. 1645,) visited Cashmere: he was succeeded by Tarbiat Khan in whose time a famine occurred, (A. D. 1647;) after two years Hussein Beg Khan (Usbuk) (A. D. 1649,) succeeded, whose tenure of power was also two years. Allie Murdan Khan now became Governor of Cashmere for the second time. A. D. 1651.

This nobleman was governor of Lahore as well as Cashmere, and was in the habit of spending the winter season at the former city, and proceeding to Cashmere on the approach of spring each year. For his convenience in these journeys (A. D. 1651,) he built many Seräis along the roads leading into Cashmere, some of which remain to this day; his travelling expenses are said to have amounted to a lakh of Rupees (£10,000) each trip. In this governor's time there were "bread-riots" in which many lost their lives.

The emperor visited Cashmere in the summer of 1061 H., and was accompanied by many poets and savants: amongst the former, a certain Hadjie Mahomed Jan, a Persian, composed a poem on the country, but appears to have been more impressed with the difficulties of the road than the beauty of the landscape. He compares the sharpness of the passes to the "swords of the Feringees," and their tortuous ascents to the "curls of a blackamoor's hair!"

رہی پیچید تر از موئی رنگی بہ تندی چون دم تیغ فرنگی

Of all the emperors of Delhi, Shah Jehan appears most to have affected the strains of poets and musicians, and, as they and the courtiers increased in the land, the Rishees and devotees, for which Cashmere had been so celebrated, receded like game before the hunter, into the most dreary solitudes, and were in danger of becoming extinct amidst the discouragements of this festive court, until they again recovered under the subsequent reign of the orthodox Aurungzebe. A. D. 1657, (H. 1048,) Luskur Khan succeeded Allie Murdan, and during his short tenure of power, so severe a winter occurred, that the river and all the lakes were frozen over, hard enough to admit of passage on their surface. This year also the emperor Shah Jehan was deposed by his son

Alumgire or (vulgo) Aurungzib and confined for life in the fort of Agra, where he died (H. 1076). رضي الله عنه ١٠٧٦

A. D. 1658.—Aurungzib being confirmed on the throne appointed Etimaad Khan Soobahdar in the year 1660 A. D. of whom I can find no other record. In the year 1662 A. D. (or according to others 1664 A. D.) Ibrahim Khan son of Allie Murdan Khan was sent to Cashmere as Soobahdar.

This year also the emperor commenced his progress to Cashmere, and here we fortunately possess the graphic pages of Bernier, who accompanied Aurungzebe as state physician; these give us a lively picture of the state and magnificence of an imperial progress; according to him the emperor's cortège set out from Delhi on the 6th December, (A. D. 1663,) at 3 P. M. that hour having been pronounced an auspicious one by the court astrologers.

It consisted of 35,000 horse and 10,000 foot, 70 pieces of heavy cannon, and 50 or 60 light field-pieces, or (as it was called) "stirrup artillery." Roshenara Begum accompanied the emperor, and our physician enlarges upon the spectacle of her stately train of elephants on the line of march.

A. D. 1664.—The army arrived at Lahore, 25th February, and crossed the Pir Pinjal about the beginning of April; during the passage an accident occurred, several of the elephants being pushed over the precipices, and many of the ladies of the royal zenana were killed on the spot. The Emperor remained three months in Cashmere; on his departure Ilsam Khan was appointed Soobahdar: it is recorded of this ruler that he rooted up all the mulberry trees which formerly grew in front of the great Eedgurh, as their fruit dropping, soiled the clothes of the faithful collected for prayers: however he planted the present magnificent chenar (plane) trees in their stead. Thus do Cashmere chronicles abound in the most insignificant facts affecting their native country. The following year (A. D. 1665,) Saif Khan was appointed to succeed, in whose time Hussein Mullick (son of Hyder Mullick the historian) was put to death by order of the emperor for speaking disrespectfully of the Prophet. Saif Khan was a stern tyrannical governor, but was soon succeeded by Mobazir Khan, (A. D. 1667,) during whose term of power the king of Kashgur passed through

Cashmere on his way to Mecca, and was, by order of the emperor, presented with half a lakh of Rupees (£5,000) and equipments for his pilgrimage. Mobazir Khan was himself a good well-intentioned man, but his Usbeg guards oppressed the people and even murdered many, on which account he was recalled by the emperor, (A. D. 1668,) and Saif Khan re-appointed governor. An earthquake occurred the following year, but did no great damage. Saif was succeeded by Iftikar Khan, (A. D. 1671,) but did not leave Cashmere, which he adopted as his residence, and where he seems to have held a sort of court. About this time a great fire again partially destroyed the Jumma Musjid and a great part of the city of Srinugger.

A. D. 1675.—Hawam-ood-deen Khan ruled three years. Ibrahim Khan was appointed a second time, (A. D. 1678.) He commenced his rule under unfavourable auspices; during the first year great floods, and the following year severe earthquakes did much damage to the country. Religious disturbances also broke out between the Shiahs and Soonees; however, notwithstanding these domestic calamities, this governor invaded and conquered Thibet. He was succeeded by Hefzoola Khan, (A. D. 1685,) who, however, after a short sojourn, appointed Abul Futteh Khan as his Naib and proceeded to court. A famine occurred.

A. D. 1689.—Mozuffer Khan appointed governor. He proved to be a very tyrannical ruler, so much so, that the people showed signs of rebellion, and he was compelled to fly the country after ruling one and a half year; however, his brother Aboo-nusser Khan (A. D. 1691,) succeeded him, and he also was a tyrant. Fazil Khan (and Kasi Khan) succeeded (A. D. 1697) a good governor, who improved the city in many ways; during his time also a hair of the prophet Mahomed arrived from Mecca, and was deposited in the mosque at Hazrat-bul on the banks of the Bhut Dul. After being in power three and half years Fazil Khan was at his own request relieved by Ibrahim Khan A. D. 1701 (for the 3rd time). This governor was ordered by the emperor to invade Kashgur, but excused himself on the plea of insufficient means in men and money; upon this his successor was appointed, Nawasish Khan, who was on his way to assume his government when news of the emperor's death reached him, upon which he seems to have returned to Court, and never to



have reached Cashmere. The emperor Aurungzib died at the age of ninety-one (A. D. 1706,) in the year 1181 Hej. (دخل الچنت ۱۱۸۱).

It is amusing to observe the extravagant praises which our orthodox historian Mahomed Azim, whom I have chiefly followed about this period, confers upon Aurungzebe, whom he infinitely prefers to the noble and enlightened Akbar, of whom he complains that he "treated all his subjects alike!" not favouring the Mahomedans above the Hindus.—Was ever a nobler tribute paid to a ruler? Shah Alum succeeded to the throne of Delhi, (A. D. 1706,) and despatched Jaffer Khan to relieve Nawazish Khan who does not seem to have assumed the functions of government; he proved to be a bad governor and a mob set fire to his residence.

He died at Cashmere of drink and excess, and, according to the record of his death, must be faring badly at present. جان جفرخان ۱۱۲۱ contains the date Hejira 1121, (A. D. 1709).

The nobles now assembled and elected Aruf Khan Naib of the country, as a temporary measure, until the Emperor's pleasure should be known. Shah Alum (A. D. 1709,) accordingly appointed Ibrahim Khan, (fourth time) who was at this time governor of Kabool and Peshawar and who died shortly after his arrival in Cashmere; Aruf Khan thus remained Naib. Nawazish Khan now at length became governor. A great fire and floods occurred in his time. He was succeeded by Anatoola Khan (A. D. 1711,) who left Aruf Khan as his Naib, upon whose death however within the year, he appointed Mushuruf Khan, his own son-in-law, Naib, and himself departed on a pilgrimage to Mecca. He was however superseded on the accession of the Emperor Firokshere (1712) the following year. Anatoola Khan was of Cashmere descent. (A. D. 1712). This year Shah Alum died at the age of seventy-one, and was succeeded by his son Firokshere, whose mother was a Cashmerie.

His elder brother Jehandar Shah had gained possession of the throne for a few days and made the son of Anatoola Khan his Wuzzeer: Firokshere therefore on gaining the mastery put his brother to death and imprisoned the latter forty (40) days. He bestowed upon Syud Khan Bahadoor the Soobahdaree of Cashmere, who despatched Allie Mohamed Khan as his Naib. A rebellion broke out in the hills about Puklie which however was put down by



the Naib, who exercised such severities on the occasion that he was recalled, (A. D. 1714,) and Azim Khan appointed in his place: however, after an interval of one year Allie Mohamed was reinstated as Naib of Syud Khan Bahadoor, (A. D. 1716). Ehteram Khan succeeded as Naib for one year. Anatoola Khan now returned from Mecca, was received with distinction by the Emperor Firokshere, who conferred upon him the Soobahdaree of Cashmere; he accordingly sent (A. D. 1717,) Meer Ahmud Khan as his Naib. The practice of appointing Naibs seems now to have fairly come into fashion amongst the great nobles of the Mogul court, who looked upon their appointment solely as a vehicle of extorting money from their respective governments. We may conceive that the condition of a province thus governed was not generally happy. The present Soobahdar, however, seems to have been a conscientious man, and selected his Naibs with a view to the faithful government of the country; but the first of them Meer Ahmed Khan had scarcely arrived when his government was disturbed by a fanatic named Motavie Khan, who excited serious religious disturbances, which the Naib was unable to suppress. The second Naib Abdoola Khan, (A. D. 1719,) who relieved him, met with no better success; at length the third Naib his successor Momind Khan succeeded in defeating and killing the fanatic Motavie Khan, but was still unequal to govern the country. Anatoola Khan meeting with no better success in the choice of his deputies, now requested to be relieved, and accordingly Saif-ood-dowlah (A. D. 1721,) was appointed to succeed him.

Meantime the throne of Delhi had been occupied by several puppet kings set up by Syud Hussan Allie Khan, Soobahdar of the Dekkan, who got the upper hand of the Emperor Firokshere, whom he imprisoned, blinded, and afterwards put to death.

A. D. 1718. The throne was then successively occupied by Rufiushan for five months and Rufiut-dowlah for six months, till in the year 1720, ۱۱۳۲ ظرب سنه, Mahomed Shah ascended the throne of Delhi, and soon after appointed Saif-ood-dowlah viceroy of Cashmere, who, however, only retained it six months; he then sent a Naib named Nujeeb Khan, who remained one year.

A. D. 1723.—This year Azim Khan was appointed Soobahdar; during his one year of power a famine occurred.

A. D. 1724.—Anatoola Khan now again (third time) undertook the government of the country, and appointed as his Naib Faqeer-ood-deen, who remained for a few months over the year, when his patron Anatoola Khan died and was succeeded in the Soobahdaree by Acheedat Khan. The latter despatched Abul Burkat as his Naib who remained three years until a successor to his patron was appointed, Soobahdar Agher Khan (A. D. 1728,) who assumed his government in person at Cashmere: he countenanced tyranny and exactions on the part of his subordinates, of which malpractices the Cashmeries laid a formal complaint before the Emperor, but meeting with no redress, they took the law into their own hands, and stoned the obnoxious viceroy out of the city of Srinugger. Soobahdar Ameer Khan succeeded and reappointed Abul Burkat, (A. D. 1729,) the former Naib of the country, but after two years he superseded him by Ehteram Khan, in whose time there were bread riots and several grain-holders lost their lives.

Encouraged by the new Naib's unpopularity, Abul Burkat now rebelled and forced Ehteram Khan to fly the country. The Soobahdar Ameer Khan was now dispossessed of Cashmere by the Emperor, and Dileer Khan of Paniput appointed to succeed him, (A. D. 1735;) the latter however died at Lahore on his way to assume his government. Ameer Khan therefore remained Soobahdar one year longer, but being worsted in a battle with a rebel Rajah Jafr Khan, he fled to Hindustan. This year also the country was deluged by great floods, and an earthquake which lasted for three months caused considerable damage.

A. D. 1736.—Juleel-ood-deen Khan was now appointed Soobahdar, but met with no better success than his predecessor, in governing the country. Cashmere in fact, perhaps through the influence of Nadir Shah who was at this time engaged in subduing Kabool and Peshawar, seems to have been in a very disturbed condition; however Fakr-ood-dowlah, a noble apparently in the interest of Nadir Shah, drove away the rebel Jafr Khan and his allies into their hills, assumed a sort of regal state in Cashmere and administered the government on his own responsibility. Meantime Utteehoola Khan (as son of Anatoola Khan) had been appointed Soobahdar by Mahomed Shah, and sent a son of Mushuruf Khan named Aswaim-

ood-deen Khan as his Naib. He, however, on arriving in Cashmere, was imprisoned by Fakr-ood-dowlah, who soon afterwards appointed his own Naib Kazie Khan and left the country.

During his absence the imprisoned Aswaim-ood-deen Khan (A. D. 1736,) managed to escape and to get the upper hand of Kazie Khan, who fled. Cashmere has now, since the beginning of the century, exhibited the spectacle of a province governed by the creatures of an absent ruler, himself the courtier of the supreme Emperor, who, in his turn, by this time of the declension of the Mogul power, was generally a mere puppet in other hands, and but little his own master. Observing this, it can scarcely excite surprise that the various Naibs should have taken advantage of the state of things, and endeavoured to render themselves more or less independent.

In fact from about this time we shall find most of the governors of Cashmere in common with those of the other provinces of the tottering Mogul throne, little short of independent rulers. In the year Hejira 1151, (A. D. 1738,) Nadir Shah having overrun Kabool and Peshawar, set out on his invasion of Hindustan, and on his arrival at Lahore was met by Fakr-ood-dowlah, whom he appointed viceroy of Cashmere, and then resumed his march towards Delhi. As his progress during the invasion belongs to the general history of India, we need not to follow it further than as it effects the province whose history is our subject. The battle of Paniput ensued, in which many Cashmerie nobles, officers of Mahomed Shah, were slain, and Delhi was subsequently sacked by the soldiers of Nadir Shah. After due submission to the conqueror, Mahomed Shah was reinstated on the throne, and thus Cashmere still remained a province of the Mogul empire.

Meantime Fakr-ood-dowlah had returned to Cashmere, of which he remained master for forty days, and coined in the name of Nadir Shah. The Cashmeries however, (A. D. 1738,) objecting to an Emperor of the Shiah sect, turned out his Soobahdar in an *éméute*, and, shortly afterwards the news arrived that Nadir Shah had spared the province to the Emperor Mahomed Shah, who in fact the following year bestowed the Soobahdaree on Anatoola Khan (A. D. 1739,) who appointed Abul Burkat his Naib, and followed in person three months afterwards. A quarrel soon ensued between



them and some fighting took place, which terminated in the death of the Soobahdar by the hand of an assassin. Abul Burkat, however, does not seem to have been privy to this act; indeed Mahomed Azim the historian of the period, expressly affirms his innocence.

A. D. 1740.—Abul Burkat having thus thrown off his allegiance, sought alliances amongst the surrounding tribes. The Rajah of Kishtewar especially sent troops to his assistance, and with their aid he succeeding in putting down all present opposition to his power. The usual effects of foreign alliances however soon developed themselves, and the Kishtewaries plundered the city and country. The following year a comet was visible in Cashmere, to oriental superstition ever associated with portents of war, or other extraordinary events.

A. D. 1741.—In fact the same year Asud Khan was commissioned by the Emperor to proceed to Cashmere and reduce the refractory Naib. At his instigation the Rajah of Paonch attacked Abul Burkat and his allies, 500 of whom fell in battle: notwithstanding this reverse however Abul Burkat still held out, (A. D. 1745,) nor was it till the arrival of Shere Jung Bahadur, the Naib of the Nazim Sufter Jung, that he, four years afterwards, was induced to surrender his government and present himself at the court of Delhi, where he died the same year. (Hej. 1158).

Shere Jung had scarcely remained six months when Afrasiab Khan succeeded as viceroy of Cashmere, (A. D. 1745,) over which he exercised a vigorous rule for nearly nine years. At this time the accumulated phenomena of ages would appear to have burst forth on the devoted inhabitants of the happy valley; during the two first years of Afrasiab Khan's government, a dreadful famine occurred, during which it is said that slaves sold for four pice (about a penny) each. The famine produced its natural result, a pestilence, which swept away many thousands of the people; an eclipse also added to their terror, and storms of rain followed by floods, carried away all the bridges.

In the year Hejira 1160, (A. D. 1747,) Nadir Shah was murdered, and his successor Ahmed Shah, having expressed some intention of visiting Cashmere, the nobles secretly despatched a



letter inviting him to take possession of the country ; the letter was however intercepted by Afrasiab, and the nobles finding their plans discovered, openly rebelled against the Soobahdar, and set up (A. D. 1747,) Asmutoola Khan as governor of Cashmere, for the Emperor Ahmed Shah Abd-allie ; he succeeded in gaining possession of the city for a day or two, (A. D. 1747,) when he was shot by a soldier of Afrasiab Khan who resumed the government, but died shortly afterwards by poison. His son Ahmed Allie Khan a boy, was maintained as his successor for one-half month ; after which Mullick Hussan Khan a Cashmerie was in power some three months, when the nobles wrote to Mahomed Shah to name some governor of the country. He accordingly appointed for the present, until his successor should arrive, Meer Ahmed Mokeem, who, however, after ruling five months, was attacked and driven away by Abul Kasim, a son of Abul Burkat.

A. D. 1752-3.—This year Ahmed Shah Abd-allie being at Lahore, the fugitive Meer Ahmed Mokeem presented himself before him and craved assistance. The Emperor accordingly despatched a force under Abdoola Khan Ashuk Akarsu to his aid. The Mogul governor fled at his approach, and the victorious Abdoola Khan, setting aside his powerless ally, seized the country, and, during the six months he remained as governor, plundered and extorted a crore of rupees from the unhappy valley already exhausted (A. D. 1752,) by pestilence and famine, with which he presented himself before his master Ahmed Shah ; having left Rajah Sookh Jewan as his mooktear. Cashmere thus passed from the sway of the Mogul throne, under that of the Dooraneees, and we shall accordingly here close that portion of its history.

#### PART 4.—*Cashmere under the Dooranee Governors.*

A. D. 1753.—Abdoola Khan, the first Dooranee governor, having left Rajah Sookh Jewan as his mooktear departed from Cashmere, which was again desolated by a famine. No sooner, however, was his back (H. 1167,) turned, than a general impatience at Dooranee rule manifested itself. Rajah Sookh Jewan, placing himself at the head of the movement, began to form a confederacy amongst the surrounding hill tribes, and to entertain soldiery which gradually swelled

into an army of 40,000 men. Thus backed he considered himself powerful enough to resist Ahmed Shah to whom he refused to pay any tribute, and being a popular man and a good and just governor, seems to have aimed at rendering his country independent and himself a king; but a terrible punishment was in store for the ambitious Rajah. The wrath of Ahmed Shah (A. D. 1754,) had long been kindled against the refractory Cashmeries, but his attention had been distracted by more important matters, until on his return to Lahore in the year 1754 A. D. he was at leisure to turn his eyes towards the rebellious province and deemed it a favourable opportunity of chastising the leader of the insurrection.

He accordingly entered into an alliance with Runjeet Dehn of Jummo, guided by whose advice and aid he despatched an army under Noor-ood-deen Khan to invade Cashmere. Sookh Jewan collected his allies and advanced to meet him at the head of 50,000 men; he was however deserted by his nobles, seized and blinded by the successful Noor-ood-deen, who sent him in chains before the Emperor Ahmed Shah under whose horse and those of his courtiers the unfortunate man was trampled to death.

In his misfortunes he cried :

چشم از وضع جهان پوسیده به سو بسر احوال آن نا دیده به  
گردھی سیرس دید زهرت عوض زین سیه مار جهان ترسیده به

A. D. 1754.—Noor-ood-deen Khan then became governor of Cashmere, over which he ruled with moderation for more than eight years; he was then recalled by Ahmed Shah, who replaced him by Bullund Khan Soodozie (A. D. 1762.) He proved a good governor, but endeavoured to restore the exhausted country and remitted all taxes, for which reason falling, like his predecessor, under Ahmed Shah's displeasure, he was recalled after two years, (A. D. 1764,) and the good Noor-ood-deen Khan installed a second time as governor. He, however, after a short time, hearing he was to be shortly superseded, anticipated his orders, and leaving his nephew Jan Mahomed Khan as Naib, proceeded to Kabool to plead his own cause before the Emperor. Nevertheless Ahmed Shah (A. D. 1765,) appointed Kurrum Khan governor, who retained for three months an uncertain tenure of power, his authority being resisted by a certain Lall Khan. Observing this, Faqueer Khunt attacked

Kurrum Khan, and drove him out of the country, after which he sacked the city of Srinugger. Noor-ood-deen Khan (A. D. 1766,) was now for the third time sent by the Emperor as the only person capable of managing the country. He advanced with a considerable army. Faqueer Khunt attempted to oppose him, but finding his force insufficient to face the enemy, fled to Bombah, where he died. Noor-ood-deen Khan now ruled with great severity one year; after three years he was again relieved by Kurrum Khan, (A. D. 1769,) who however, being a weak, timid man, was unable to control the turbulent spirits of Cashmere, and fled to Jummoo; whereupon his commander-in-chief Ameer Khan Sher Jewan seized the valley on his own account, and refused to send tribute to the Emperor: to strengthen his position he built the Sher Ghunie (thus named after himself and not Sheregurrie or Shiahgurrie). The island called Sona Lank also owes its origin to this chief. He also sought to ingratiate himself with the Hanjies or boatmen of Cashmere, who are in fact sturdy fellows whose cordial support might be useful to a well concerted defence of the valley. Ameer Khan seems, in fact, to have altogether thrown off his allegiance to Ahmed Shah, and to have maintained an independent court of his own; which he maintained until the death of Ahmed Shah Abd-allie; that Emperor's son, however, (A. D. 1773,) Timoor Shah, having succeeded to his father's throne of Kabool, despatched Hadjie Kurreemdad Khan as Nazim, backed by a large army to enforce submission. Ameer Khan met him at Baramoola and a battle ensued, which ended in the defeat of the latter, who fled to Kishtewar, but was seized and sent to Timoor Shah, who, however, pardoned him after a short time. Hadjie Kurreemdad Khan was governor of Cashmere six years, and died there. (A. D. 1776,) Shocks of an earthquake which lasted three months occurred during his rule. His son Asad Khan succeeded to the government, (A. D. 1783,) and soon discontinued the tribute to the Emperor. He was however a very cruel ruler, on which account a conspiracy to put him to death was formed against him by some of his household officers; he was wounded in the scuffle, but contrived to escape to the river, collected some troops and drove the conspirators into the fort, where he besieged them for seven days; after which, endeavouring to escape, they were



seized and burnt to death by the cruel Asad Khan, who now became more tyrannical than ever, and, according to the expression of the historian, "killed men like birds." Stories are told of his extreme cruelty; amongst others a story is current in Cashmere of his throwing into the fire his own infant child who it appears had offended his cleanliness. At length (H. 1200,) the Emperor Timoor Shah (A. D. 1785,) despatched an army against him under Muddud Khan Sakzie, who succeeded, after a long campaign, in defeating Asad Khan, who fled to Poonch, but receiving no asylum there, he shot himself. Muddud Khan then assumed the temporary government for four months, (A. D. 1787,) when Meerdad Khan Kasijie succeeded him, but died after seven months: Moola Jaffer Khan (A. D. 1788,) succeeded for three months; till the arrival of Jooma Khan Kasijie, who was governor for four years, during which period he went several times to pay his respects to the Emperor. He died in Cashmere, and Ramootoola Khan succeeded for three months and twelve days, (A. D. 1792). Meer Hazar Khan Kasijie was then appointed Soobahdar: but soon afterwards Timoor Shah died and was succeeded by his son Zeman Shah, (A. D. 1793.)

A. D. 1793.—Taking advantage of Timoor's death Meer Hazar refused tribute and set up for himself; upon which the new Emperor Zeman Shah despatched Mirza Khan, (al-Kozyie) the rebellious governor's father, to endeavour to bring him to his allegiance. Meer Hazar Khan however imprisoned his father on his arrival, and openly threw off all allegiance to the Emperor; who shortly afterwards sent an army under Ahmed Khan Shihungchee Bashee to bring him to his senses. Hazar Khan however closed the Baramoola road, and suspecting some of his Hindu retainers of treachery, bound them in large cooking vessels, (or boilers) and thus threw them into the river Jhelum. He was nevertheless defeated and fled to the city, where he took sanctuary in the Shah Hamedan Mosque, but he was enticed out, thrown into prison and sent before the Emperor. He had enjoyed power little more than a year.

Ahmed Khan after remaining three months in Cashmere was relieved by Kaffyat Khan, and proceeded to Kabool with Hazar Khan and some other prisoners. Kaffyat Khan after nine months



left the government in the hands of Buddur-ood-deen his Naib, but returned the following year. He was a very splendid ruler, by which perhaps he incurred the Emperor's displeasure, as the following year, he was superseded by Mahomed Khan Jewan Shere who, on arriving at the Sheregurrie, imprisoned Kaffyat Allie. The latter's party, however, headed by his kinsman Meer Khan, rebelled and released him shortly afterwards. (A. D. 1795). Things being in this state at Cashmere, Shah Zeman himself visited the country, accompanied by his Wuzzeer Sher Mahomed Khan Mooktar-ood-dowlah, and made prisoners of all the contending parties. After remaining eight days the Emperor departed, leaving the government in the hands of Abdoola Khan Kasijie, who ruled with judgment for the space of one year; when he went to pay his respects to Shah Zeman. It was about this time that the Wuzzeer Wuffadar Khan, who had in fact been instrumental in placing Shah Zeman on the throne of Kabool, defeated a conspiracy and put to death Sirfraz Khan (father of Dost Mahomed) and twenty-two others of the principal chiefs of the Barukzyies; Futteh Khan, eldest brother of Dost Mahomed, and a younger brother named Azim Khan alone escaping the massacre to Herat. Abdoola Khan having paid his respects at court returned to Cashmere, and cultivated the friendship and alliance of the nobles of that country.

A. D. 1796.—He also gradually entertained an army of 30,000 men, by which measures he incurred the jealousy of Wuffadar Khan Wuzzeer, and was suddenly recalled to Kabool, and imprisoned in the Bala Hissar: (A. D. 1800). On his road to Kabool he had married a daughter of the Rajah of Mozafferabad, to which chief, as well as his younger brother Attar Mahomed Khan, (whom he had left as Naib during his absence) he now wrote, ordering them to hold out the country against the new Naib Moola Ahmed Khan.

A. D. 1801.—Shah Zeman shortly afterwards invaded Hindustan, and had penetrated as far as Lahore, when the intelligence reached him that his own brother Mahomed Shah of Herat, together with the fugitive Futteh Khan, had invaded Kabool in his absence: he accordingly returned precipitately, abandoning men and guns on the road, which last were forthwith seized by Runjeet Sing, (A. D.

1801,) then rising into power. On his return to Kabool the unfortunate Zeman Shah was deserted by his nobles, seized, blinded, and imprisoned. His Wuzzeer Wuffadar Khan, by whose power he had been sustained so long, was put to death, and the triumph of the Barukzyies was complete. The unfortunate Zeman Shah in his misery composed some couplets, which have since passed into household words amongst his countrymen. I may here remark on the singular habit of orientals, on the approach of death or other misfortunes, like the fable of the dying swan, singing their own elegies in doleful strains; which are frequently gravely recorded by the native historians as matters of history. To return, however, to the more immediate history of Cashmere.

A. D. 1800.—Abdoola Khan had been confined in the Bala Hissar, and, as before stated, Moola Ahmed had been despatched as Naib to assume the government of Cashmere; but on his arrival, the latter was imprisoned by Attar Mahomed Khan, son of Abdoola Khan; who together with Futteh Khan Rajah of Mozafferabad, were now encouraged to resistance by the news of Shah Zeman's defeat and death.

A. D. 1801.—Nissar Khan also, the commandant of the Bala Hissar, released Abdoola Khan, and, following his fortunes, accompanied him to Cashmere, where he received a present of a lakh of rupees (£10,000) for this service. Abdoola Khan being thus reinstated in his government, seized many of the surrounding countries, enlisted soldiers, and sent no taxes to the new Emperor Mahomed Shah.

A. D. 1806.—At length that prince, being established on his throne, despatched an army under Wuzzeer Shere Mahomed Khan to bring Cashmere into subjection. This force was met by the army of Abdoola Khan, which occupied the strongholds guarding the Baramoola pass. Shere Mahomed at first entered into negotiation, and by means of cajolery and bribes, succeeded in passing Mozafferabad, and penetrating as far into the valley as Baramoola, (situated at the gorge of the pass leading into the valley,) without much opposition. The eyes of Abdoola Khan were, however, now opened to the approaching danger, and he gave battle at Baramoola in person. The engagement ended in his defeat, and he was forced

to take refuge in the mountains ; and Shere Mahomed entered the city and assumed the government. Abdoola Khan was, however, tacitly allowed to return and take up his quarters in the city, where he shortly after died. Shere Mahomed then sent for the late Soobahdar's son Attar Mahomed Khan, who was cooped up in the fort of Beyrwa, appointed him Naib, and returned to Kabool, which was still distracted by the rival claims of the descendants of Timoor Shah. During the one year this governor remained at Cashmere, a crore of rupees came to the treasury from the country, owing to the unusual activity of trade and the influx of foreign merchants, &c.

افضل رحمانی سنہ ۱۲۲۱

The ensuing year his successor, Akram Khan, was appointed who, on arrival, was defeated by Attar Mahomed, and his whole army made prisoners ; the latter, however, made a mild use of his victory : he soon after presented each soldier with clothing and sent them back to Afghanistan. After this, Mahomed Shah did not think it advisable to disturb Attar Mahomed in his government, and the latter occupied his leisure in organizing his means of resistance.

A. D. 1807.—He repaired and strengthened the fort of the Koh-i-marán on the Harriparvat and built a strong fort at Mozafferabad, and several ghurries along the same road. His brother Jehandad Khan had also strengthened himself at Peshawar ; he held the fort of Attock, and the family contemplated an organized resistance to the Barukzyies. During this period Kabool was convulsed by the rival claims of the Barukzyie and Suddoozyie factions. At length in the year H. 1227, (A. D. 1812,) Mahomed Shah sent his captive brother Soojah-ul-Moolk to Cashmere, where he was imprisoned in the fort of the Koh-i-marán.

On the retreat of Shah Zeman from Lahore in the year A. D. 1801, Runjeet Sing had risen rapidly into importance, and had consolidated a nation whose elements he found existing in the Punjab in a disjointed form. He was now in fact (A. D. 1813,) amongst the number of the princes of India, and was even deemed an ally worthy of the British Government. Thinking him a fit co-adjutor, Futteh Shah therefore, feeling himself unequal to the conquest of



Cashmere thus fortified by the Suddoozyie brothers, proceeded to Lahore towards the end of 1812 A. D. and entered into a treaty for a subsidiary force for the invasion of the recusant valley for which it was stipulated, Runjeet Sing was to receive eight lakhs of rupees yearly.

A. D. 1813.—Mokim Chund was accordingly sent in command of a force of 12,000 men; which contingent, acting in concert with that of Futteh Khan, commenced an invasion of the country. Attar Mahomed drew out his forces for battle, but, being deserted by some of his officers, and suspecting treachery in others, he shut himself up in the Shereghurrie whilst his brother held out the Hari Parvat. However the enemy agreed to listen to terms, and, after an interview, Attar Mahomed, with his family and treasure, was allowed to depart peaceably for Peshawar; and thus Futteh Khan gained possession of the country. (A. D. 1813.) After remaining there but little beyond three months, he set out to beseige Attock, in which fort Jehandar Khan, brother of the late governor, still held out against him. At the same time he dismissed his ally Mokim Chund, Runjeet's general, with the first instalment of the stipulated 8 lakhs, and appointed his own brother Azim Khan, Naib of the country.

No sooner however did he approach Attock than Jehandar Khan, who had previously sold the fort to Runjeet Singh, fled and joined the Sikhs, and the Sikh government refused to surrender that important stronghold. Enraged at this breach of good faith on the part of his ally, Futteh Khan now refused to fulfil the other stipulated terms of agreement and declared war. Mokim Chund also on his departure from Cashmere had released Shah Shooja, who accompanied him to Lahore where, he was detained as a prisoner till his escape to the British territory. (A. D. 1814.)

Runjeet Singh on the pretext that the eight lakhs of rupees was an annual tribute, now, at the head of a considerable army, invaded Cashmere in person.

The Sikh army arrived at Rajoorie on the 11th June, 1814, and equipped itself for hill warfare, before attempting to force the passes of the Pir Pinjal. The Rajah of Poonch (Rahoola Khan) had openly joined Azim Khan, the governor of Cashmere; and Ugger Khan



Rajah of Rajoorie, (A. D. 1814,) had every disposition to do likewise, had not his country been already occupied by the enemy. As it was, he beguiled them by false intelligence and treacherous guides, and was thus perhaps more truly serviceable to the Cashmere party, than if he had openly joined them. It was determined that Runjeet Singh in person should lead the principal army by the Poonch road towards Toshee-maidan, whilst a diversion should be made by Barumgulla. This last, under Ram Dyal, gained the post at Barumgulla, but it was not till the middle of July that a general advance was made.

On the 13th of that month, however, Runjeet marched from Poonch, and reached Toshee-maidan on the 18th, where he found Mahomed Azim Khan and the Cashmere army, ready to receive him; and his hesitation in attacking on this occasion led to the disasters which followed. Meantime, Ram Dyal, having forced the Pir Pinjal, and defeated the Cashmere force which attacked him at Heerpore, advanced to Shupeyon; the first town in the valley, but was there surrounded, and only allowed to retire through the friendship of Azim Khan for Mokim Chund, the grandfather of that chief.

Runjeet Singh's army at the same time, being discouraged by the delay in attacking the enemy, had lost ground, and eventually been forced into a precipitate retreat to Poonch, with the loss of its baggage; Runjeet Singh quitted the camp and hurried to Lahore. The victorious Azim Khan now resumed the quiet discharge of his duties as Naib of the province, and, having suspicions that the Dewan Hurdoss had invited Runjeet Singh to invade the country, he put him to death. Runjeet Singh, however, seems to have been merely instigated by the wish of extorting the annual tribute of eight lakhs of rupees; which, after the first payment made to Mokim Chund, had been withheld by Azim Khan. The year following this unsuccessful invasion a severe famine occurred in Cashmere, and many perished. There was also a very severe winter: the lakes and rivers being all frozen over.

A. D. 1814.—The governor Azim Khan began now to oppress the Hindus, whom he suspected of a disposition favourable to the Sikhs. At length, after being in power six years, during which pe-

rior he had amassed two crores of rupees (£2,000,000) extorted from the unhappy country ; he left his brother (A. D. 1818,) Jubbar Khan as Naib and proceeded to Kabool, to the assistance of his eldest brother Futteh Khan, at that time a prisoner in the hands of the Sud-dozyies. He was, however, too late to prevent that high-spirited chieftain from being foully assassinated in the presence of (and by order of) the Shah. It does not fall to our province to trace the future career of Azim Khan : He subsequently became ruler of Kabool, when, misunderstandings occurring betwixt himself and Dost Mahomed Khan his younger brother, whose force of character he appears never to have fully recognized, he allowed, by his own indecision of character, the golden moments of opportunity to pass, and died of a broken heart 1823 A. D.

Jubbar Khan being left as Naib of Cashmere, (A. D. 1818,) evinced every disposition to govern well, and carried on his government with mercy and equity for the space of six months. After his unsuccessful invasion of Cashmere in the year 1814 A. D., Runjeet Singh had occupied himself in repairing the losses sustained by his arms, in punishing the hill Rajahs, and other allies of Azim Khan this side the Pir Pinjal, to whom he mainly attributed his repulse. At length in the spring of 1819 A. D., encouraged by his recent success against Mooltan, and instigated by Dewan Misr Chund and other advisers, he collected an army as numerous "as ants and locusts," (lit.) and invaded Cashmere a second time. Taught by former reverses, Runjeet Singh now adopted every precaution to ensure success; he divided his army into three divisions; the "advance" under Misr Dewan Chund; the "support" under Prince Khurruk Singh; and the "reserve" under Runjeet himself. By the month of June 1819, the Dewan had occupied Rajoorie, Poonch, and all the hills this side of the Pir Pinjal; and on the 23rd by a simultaneous attack carried the positions of the Rajahs of those two states, who covered the passes: (A. D. 1819). At the same time Khurruk Singh's support occupied Poonch and Rajoorie. Meantime, the Cashmere governor Jubbar Khan, made some show of resistance; he advanced in person as far as Heerpore, and sent forward troops to close the pass; but his arrangements for defence were ill-concerted, as he allowed Dewan Misr Chund to turn his

position by a flank march, and to take up a favourable position in his rear at Deopore. There, however, he engaged the enemy with 5,000 men on the 5th July, but was wounded and defeated after a feeble action, and fled, with his Pathans, by the Baramoola pass towards the Indus. By this time, Runjeet Singh, with the reserve, had reached Rajoorie; but did not proceed to view his conquest, of which, indeed, he appears to have entertained a superstitious dread, and never visited in person. Dewan Misr Chund therefore advanced and occupied the city and country, which thus, after the lapse of nearly five centuries, again fell under the sway of a Hindu sovereign.

A. D. 1819.—The date is contained in the following Sikh War cry, the letters of which correspond to the Hindu year 1876 of the era of Vikramaditya.

بولوچي واه گروجي کا خالصا بولوچي واه گروجي کي فتح

#### PART 5.—*Cashmere under the Sikhs.*

The Sikh army under Dewan Misr Chund, having thus occupied Cashmere, Motee Ram (son of the late Dewan Mokim Chund) was appointed governor of the valley by Runjeet Singh. The surrounding countries, however, still remained in a disturbed state; several chiefs rebelled along the frontier; amongst others, Shere Zeman Khan of Gundgurb, (A. D. 1820,) against whom a force was sent, under Ram Dyal the governor's son, who was killed in action.

Ugger Khan also, the rebellious Rajah of Rajoorie, was in May, seized by Golaub Singh, who for this service obtained the Jageer of Jummo. In June the troops were relieved, and Hurrie Singh Nalooa succeeded Motee Ram as governor of Cashmere. At this time a certain Golaum Allie Kukka raised a force, and created some disturbance in the hills about Bombah; but was seized and imprisoned by Hurrie Singh, who, after governing the country two years, was relieved by Motee Ram (A. D. 1822,) for the second time. The latter however only remained one year when Goormuck Singh was appointed governor, his *peshkára* being Chuni Lall. (A. D. 1823). After two years, he also was relieved by Dewan Keerpa Ram (son of Motee Ram); in whose time the great earthquake occurred, which laid every house in the city low;



during the three months of its continuance, the shocks at first were not less than 100 per diem, after which they gradually diminished : the inhabitants lived entirely in tents. At this time the Rajah of Mosafferabad revolted, but was defeated and made prisoner by Keerpa Ram. This governor was very fond of display, but was nevertheless a good ruler. At length he excited the jealousy of Rajah Dhian Singh, the minister of Runjeet, who brought about his recall, (A. D. 1830 ;) the order summoning the governor to appear at the Lahore durbar and give an account of his stewardship, took him entirely by surprise ; it arrived during a nocturnal fête, which he was enjoying with his suite at the Lank island, in the city lake, (locally, the dhull,) which he had illuminated for the occasion. This sudden disgrace, arriving thus in the hour of revel, greatly disconcerted the unfortunate Keerpa Ram, who nevertheless obeyed, and proceeded to Lahore, where he was imprisoned for a short time on the plea of embezzling the public money : subsequently his own and his father Motee Ram's estates being confiscated to make good the pretended deficit, he was released, and, soon after, resorted to that refuge of all disgraced Punjab functionaries, a pilgrimage to Hurdwar, where his subsequent poverty was the best argument for his innocence of the peculation attributed to him. He was succeeded (A. D. 1830,) as governor by Bumma Singh, in whose single year of power, disturbances occurred between the Shiahhs and Soonees.

A. D. 1831.—Prince Shere Singh (afterwards Maharajah) now assumed the government of Cashmere, and appointed Bisakur Singh his Dewan, who attended to the affairs of the country, whilst the Prince took his pleasure in field sports, to which he was much addicted. The Prince himself was an easy ruler, but neglected his charge, and allowed his Dewan to extort money on his own account. A great famine also at this time added to the miseries of the people, thousands of whom died, and many fled the country to Hindustan and the Punjab, where their wretched condition attracted the notice of Runjeet, who forthwith despatched Jemadar Kooshial Singh, with Bhae Goormukh Singh, and Sheikh Golaum Mohy-ood-deen, as a sort of committee to collect the revenue, and watch Shere Singh and his Dewan Bisakur Singh. Kooshial Singh (A. D. 1832,) on arrival, assumed the control of the finances from the Dewan, but the Prince



Shere Singh continued in the country as before following his favourite pursuits. Kooshial Singh, fully aware that a cash remittance was the most effectual method of convincing his master, old Runjeet, of his fitness for the commission entrusted to him, presently extorted twenty lakhs of rupees, besides pushmeenah and horses, from the already impoverished country: he was also a cruel man, and put many innocent people to death; happily for the country he departed after six months, and Colonel Meean Singh was selected by the Maharajah, on account of his humane character, as a fit governor for the unhappy valley. That officer, accordingly (A. D. 1833), proceeded towards Cashmere, but, finding that Prince Shere Singh had not yet seen fit to surrender his government, halted at Bara-moola a month. At length, that royal personage leisurely set out on his return to Lahore, after having misruled the country upwards of three years. Meean Singh then assumed the government, (A. D. 1833,) and set himself to work to repair the country, desolated by famine and oppression. He seems in fact to have been a kind and just man, who prevented his soldiers from oppressing the people. He was raised to the rank of general in 1836 A. D. as a mark of acknowledgment of his services.

In the year 1838 A. D. great floods occurred, which forced the people to take to their boats. In the following year A. D. 1839, Runjeet Singh died and was succeeded by Kurruck Singh, who followed his father ten months after. Noo Nihal Singh, Runjeet's grandson, was also killed by the fall of a gateway at Lahore: upon which a state of anarchy ensued amongst the rival Sikh Sirdars, a graphic picture of which has been portrayed by other hands, during all which struggles for power, however, Meean Singh remained quiet in his government of Cashmere; till at length he fell, in a mutiny of his troops, by the hand of one Jemadar Tellock Singh. (A. D. 1841). This mutiny was occasioned by that usual grievance amongst Asiatic armies, arrears of pay. Tellock Singh, having demanded payment of these arrears for his regiment, and being refused by the governor, immediately, as preconcerted, drew his tulwar, and calling upon Meean Singh to "go aloft" (that being the slang for death amongst the Sikhs) killed him on the spot. Thus perished the well meaning Meean Singh: intemperance and sen-

suality had however by this time gone far to obliterate the humane and just impulses with which he had commenced his career, and, in consequence of his gross appetites, his person had attained a most unwieldy and unseemly bulk. His son Sunt Singh escaped for the present to the fort of the Harrie Parwat, and thus saved his life ; but he was delivered up and imprisoned by Tellock Singh, who forthwith sacked the treasury and put himself at the head of the rebellion. Meantime, Golaum Mohy-ood-deen (a Mahomedan) had been despatched as governor to relieve Meean Singh, by the new Maharajah Shere Singh of Lahore, but on arriving at Shupeyon (A. D. 1841,) in progress to join, finding that the Shere Ghurrie was in possession of the rebels, he halted, and wrote for assistance. Rajah Golab Singh of Jummoo, and other Sirdars, were now despatched to put down the mutineers ; which they succeeded in effecting after several desperate engagements, in which the rebels were nearly all slain.

A. D. 1842.—Golaum Mohy-ood-deen was now installed as governor of Cashmere, under the sounding title of Nizam-ul-moolk-Etamaad-ood-dowlah. A comet appeared in this last year of the 18th century of Vikramaditya. To the superstition of Asiatics, these “wandering light stars” ever appear ominous of war and evil to the mighty of the land ; and the events of the next six years well nigh justified the predictions of the Punjab astrologers in the present instance.

During the summer of this year, (A. D. 1842,) Golab Singh remained a month, engaged in collecting and forwarding supplies to his troops, employed at this time under the famous Zorawar Singh, in reducing Thibet, to whose trade in Shawl-wool, &c. this merchant Prince had early set his eye. Soon after this, Golaum Mohy-ood-deen sent an expedition to Gilgit, which was, however, defeated with loss. Encouraged by this success, the Rajahs of Mosafferabad, Kurnah, and Kotyhar, had combined their forces, and pressed the governor so hard that he was fain to apply for assistance from Lahore. Upon this his son Sheikh Enám-ood-deen (who received the title of Ameer-ul-moolk Jung Bahadur) was despatched by Maharajah Heera Singh, who had succeeded to the guddie, with an army of 15,000 men to his assistance. On the

approach of this overwhelming reinforcement, the rebels dispersed ; and the Sheikh went to pay his respects to his father, (A. D. 1843,) who raised him to be his associate in the government. In the time of Mohy-ood-deen, the cholera created great havoc among the inhabitants, no less than 23,000 of whom are said to have died in the city alone.

At length Golaum Mohy-ood-deen, being in an infirm state of health, appointed his son (A. D. 1845,) Sheikh Emám-ood-deen governor of Cashmere, and proceeded towards Lahore to pay his respects at court. He was, however, taken ill on the road, returned to Cashmere, and there died (A. D. 1845,) after ruling the country five years.

Now comes the Sikh Campaign of the Sutlej, and the establishment of Dhullip Singh on the throne of Lahore, with Lall Singh as minister ; Cashmere being made over to Golab Singh "for a consideration." On the approach, however, (A. D. 1846,) of Golab Singh's general to take possession, the governor Sheikh Emám-ood-deen, acting under secret instructions from the Lahore durbar, refused to surrender his trust, and succeeded in beating back Golab Singh's troops ; and even advanced 3,000 men, with two guns, under Rajah Fuqueeroola Khan of Rajoorie, in pursuit. He was however induced to surrender, and Maharajah Golab Singh of Jummoo became independent ruler of Cashmere and the hills.

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*Notes on the Topography of Murree, by Dr. A. GORDON, H. M.  
10th Foot.*

*Geographical Position.*—The new sanatorium of Murree is situated on a mountain ridge in the Hazarah country; its precise geographical position being  $34^{\circ}$  N. Latitude,  $73^{\circ} 2'$  East Longitude,—and its altitude above the level of the ocean variously estimated at 7,500 to 8,000 feet.

*Aspect of the Station.*—The general appearance of the station is rendered striking, not so much by the grandeur of its scenery as from the manner in which the residents' houses are dotted about irregularly on the various prominences and acclivities, some half hid in the dense forest vegetation which clothes the more sheltered places, and others exposed on bare projecting rocks.

*General position of Barracks and Hospital.*—The barracks and hospital occupy the summit of the ridge, whose general direction is as near as may be N. and S. The private houses are built at various elevations on its western face, the bazaar and natives' huts being on the eastern. From the highest point, where it is proposed to erect an observatory, a very extensive view may, in tolerably clear weather, be obtained. To the East and N. East the Cashmere hills may be seen. Those of Cabul and Affghanistan can be traced more to the westward. To the South, the Indus, although at a distance of 80 miles in a direct line, is distinctly visible, and in the East the river Jhelum. The station of Rawul Pindee also may readily be distinguished.

*Character of Mountains.*—The general appearance of the numerous precipitous mountain masses that rise in wild confusion at and around Murree, presents unequivocal traces of the action of those disturbing forces which are still in active operation in that portion of Asia comprised between Cutch, Herat, Cabul and Affghanistan.

*Terraced faces of Hills.*—That they have been elevated by successive heaves from below, occurring at intervals of various and uncertain length appears to be clearly indicated by the terraced



Fig. 1.



faces of each, as is endeavoured to be shown in the accompanying sketch, in which the individual terraces are indicated as being of various height and breadth as they occur, and it may be noted that the few patches of cultivation, being on these terraces at the lower part of each hill, give them a very distinct

and unequivocal appearance.

*Valleys.*—Intersecting these abrupt hills occur deep valleys in which streams of clear calcareous water run with more or less rapidity over rocky beds; bringing with them boulders and irregular fragments of stone of all sizes. The valleys do not appear however to run in any definite direction but wind about irregularly, giving to each rocky ridge an isolated appearance as if totally unconnected with those immediately adjoining—and in addition to the principal line of valley, each individual slope is grooved as it were by the waste of the softer rocks by the elements; the dells thus produced being of very variable depth and precipitancy, but almost all clothed with dense brushwood and tall magnificent forest trees interspersed.

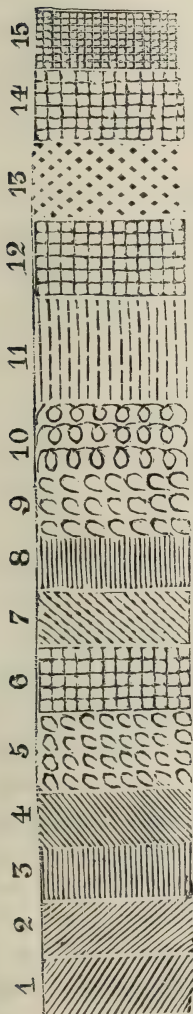
*Soil.*—The soil is not deep, but rich and prolific in the extreme: it consists of red alluvial loam intermixed with micaceous sand and containing in some places calcareous nodules as of marl both green and grey, and of kunkur.

*Geological Age of Rocks.*—The rocks constituting these hills belong to a modern period; the oldest being apparently of a date not earlier than the Eocene, but the greater portion evidently diluvial and alluvial deposits. These may, for the sake of convenience of description, be divided into two classes,—namely, the sandstone, and the calcareous.

1. *Sandstone rocks.*—The sandstone rocks constitute the ridge upon which Murree station is built, and includes a variety of substances of greater or less consistence throughout all stages from soft argillaceous mud to hard grey micaceous sandstone fit for building purposes.

*Section made by a new road.*—A new road, which, for the convenience of horse and foot passengers, is being cut along the face of the hill, reveals each individual stratum; and the following diagram, taken during a walk along it, will show the succession of these in a distance of half a mile.

Fig. 2.



*Section 1.* Blue sandstone.

2 and 3. Red clayey sandstone with green marl, the strata having different dips.

4. Red clayey sandstone without green marl.

5. Boulders of grey sandstone with stalactites in their interspaces.

6. Red argillaceous mould.

7. Grey sandstone with nodules of oxide of iron.

8. Ditto ditto without iron.

9. Boulders of grey sandstone.

10. Ditto of red sandstone with organic remains (shells).

11. Reddish sandstone containing streaks of carbonate of lime.

12. Argillaceous soil on red nodulated ferruginous rock of various consistence, with a few nodules of green marl and kunkur.

13. Brecciated clayey ferruginous stone with organic remains.

14. Red argillaceous loam.

15. Grey ditto ditto on soft grey sandstone.

*Remarks on Section.*—The above diagram is intended to represent the succession of vertical strata exposed during the formation of the narrow road to which allusion has just been made; the lower extremity (at 1,) representing the northern end of the road and the upper end (at 15,) the southern—the whole space therein comprised including one of those

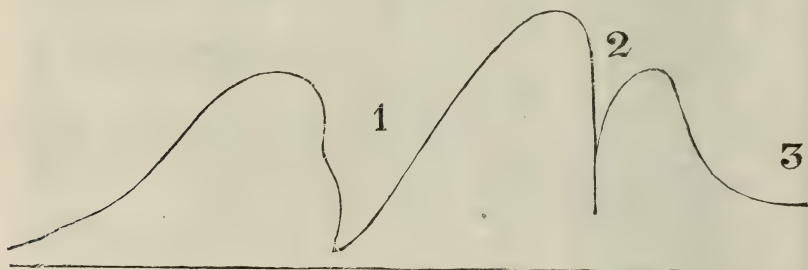
minor gorges on the mountain side that have already been described, around the upper portion of which the road winds.

In those cases where the dip of strata has been various, it has been represented in the sketch, and with reference to the figures, it will be immediately discovered how very great a variety of modern sandstone and argillaceous deposits is displayed in this short section.

*Smaller ravines how formed.*—As might be expected, the smaller ravines are formed in the softer substances, such as Nos. 6, 12, 14, and 15; the harder materials noted by the other figures forming promontories on the hill face around which the road at such parts is made to bend.

*Serrated appearance of Hills.*—It would appear as if different portions of the above line of strata had been subjected to various degrees of elevating force, so that the summit of the hill which they form has an irregular serrated appearance as shown underneath.

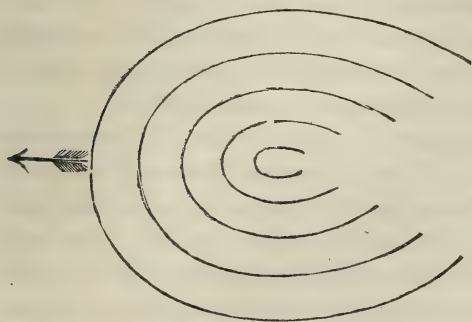
Fig. 3.



*Causes which give rise to this.*—This may, however, be accounted for by another series of causes, for although the harder strata do in reality appear to have been originally more violently upheaved than the softer materials, it must be borne in mind that the compressibility of the latter would have a considerable influence in modifying the extent to which parts formed of these would become raised. It is also evident that the elements would more readily triturate away valleys in the softer substances than in hard rock such as the grey and ferruginous sandstone, so that the gorges marked in Fig. 3, respectively 1, 2 and 3, correspond with the portions of the section marked 6, 12, 14 and 15, in Fig. 2.

*Specimen of sandstone how deposited.*—At the point marked 9 in Fig. 2, a very interesting specimen of sandstone occurs, its exposed

Fig. 4.

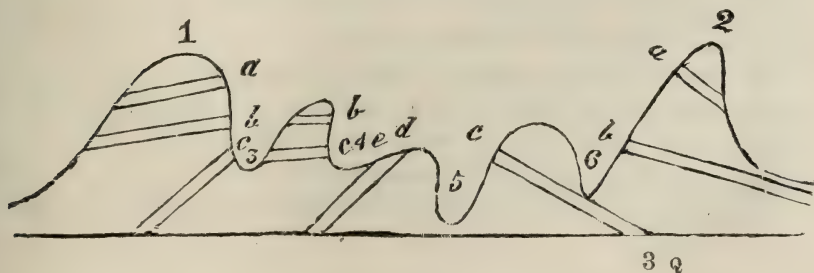


face presenting numerous concentric lines as represented in the margin, showing that the rock was originally deposited in an eddy, but it does not appear that any foreign substance of either animal or vegetable origin

exists in the centre so as to have formed a nucleus.

*Continuity of Hills destroyed and how.*—On examining the various hills around Murree and carefully noting the outcrop of individual strata on the face of adjoining ones, it becomes evident that their continuity must have been destroyed at a period considerably posterior to their solidification,—and that two distinct forces combined to produce this effect is equally clear. In the first place there are deep fissures running irregularly in the rocks, with individual portions more or less elevated than the general line of rock, showing that the layers were shattered and displaced by forces of a subterraneous nature. Then again, we find terraces with intervening cliffs of a few feet or yards in height with boulders of all sizes, showing marks of greater or less attrition in the bottoms and on the sides of the various intervening valleys—thus evincing the effect of water in a state of motion.

Fig. 5.





*Outcrops of Strata.*—The above section is intended to represent the appearance of outcrops of strata on the various mountain faces in the vicinity of Murree, and they will be readily recognised as occupying that position which a fracture would exhibit if produced by force from below, tearing asunder the strata as shown at the points marked a and b, and thus producing “a valley of elevation” such as is included between the mountain peaks 1, and 2.

It is almost needless to observe in this place that the strata above represented do not include the whole number that actually exist on the hill faces,—the object aimed at in the sketch being nothing more than to illustrate the theory of their formation now being discussed.

*Materials represented in sketch.*—The bands noted a and b may be also looked upon as representing the micaceous and clayey ferruginous sandstone which seem to constitute the great mass of the Murree hills, but as has already been stated boulders and more or less perfectly consolidated strata of clayey conglomerate containing nodules of brown iron exist towards the lower portion of these, and such strata may in a theoretic section be represented by that marked c, while the bottoms of the gorges 3, 4, 5 and 6, would be framed more or less thickly with débris of such materials,—and accordingly this is in reality found to be the case, the fragments of stone found there consisting of the same materials confusedly blended together—that constitute the substance of the neighbouring hills.

2. *Calcareous rocks, position and presumed age.*—Calcareous rocks appear to prevail to a considerable extent in the hills around Murree, although only to a small extent in that on which the station has been established. In Fig. 5, the low round hill marked d is almost entirely comprised of this formation, the underlying rock consisting of impure limestone, apparently of the Eocene period,—covered with superimposed layers of fibrous gypsum which occur in definite lines as represented by that marked e, and lying more or less conformably upon the deeper material.

In some parts, the gypsum is tinged of a rose colour, but generally speaking it is transparent and colourless. The dip of its strata is 30° or 35° from West or nearly so, to East, the line of strike being as nearly as possible North and South.

In addition to this more perfectly formed gypsum there are at the

same time found considerable quantities in a less perfectly crystallized condition, and of an impure nature, but evincing marks of deposition from igneous solution in the alternating layers of the ashy-like calcareous matter, with intervening streaks of dark clayey substance, which the fractured surface of a specimen presents.

My opportunities for observation having been very limited, it was not in my power to extend my investigations beyond the immediate vicinity of the station; but two points of considerable importance have come to my knowledge with regard to the geology of this range of hills,—namely, that a thermal spring exists within some twelve or fifteen miles of Murree from which it is worthy of inquiry whether any calcareous deposits now take place,—the other point is that a fossil bone of a large animal, supposed to be of one of the gigantic *Pachydermata* of the later Tertiary period has been discovered at about a corresponding distance in an opposite direction.

*Meteorology.*—No extended observations have as yet been made regarding the meteorology of Murree, as the sanatorium has so lately been established there. It is hoped however that the register taken from the daily observations made at the hospital there for the five months from May to September 1852 inclusive, will, if compared with similar observations made during the same period at Wuzzeera-bad, show the contrast between the temperature at that place, and in the plains of upper India, while a similar register being inserted of the range of the thermometer in the united kingdom will, it is hoped, render the comparison still more extended and complete. The latter however must refer to Dublin in 1844, as no observations for any other place or time are at present available.





*Approximation of temperature to that of Dublin.*—A bare register of the state of the thermometer gives but a very imperfect idea of the meteorological condition of any locality, and it is to be regretted that observations on more extended scales are not regularly taken at Murree. From the preceding table, however, not only may the temperature of this sanatorium be contrasted with that of a considerable military station in the plains of upper India, but a comparison may readily be established between it and that of one of the most important cities of the united kingdom,—such comparison will show, that during five months of the year at least, the difference in temperature indicated by the thermometer (in the shade) is but a mere trifle between Dublin and Murree.

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*Note on the present state of the Excavations at Sárnáth.*—By  
E. THOMAS, Esq., C. S.

On Major Kittoe's departure from Benares in January, 1853, I undertook, during my brief stay at that station, to continue his Archæological operations, so far as they related to the laying open of the inhumed remains of the old Buddhist Monastery at Sárnáth.

At the moment of engaging in this mere mechanical occupation, I trusted that Major Kittoe would, himself, be able to give to the world his own conclusions as to the date and associations of his interesting discovery. I abstained therefore, from even making myself his scholar, preferring alike to form an independent opinion which might follow the developments of the progressive explorations, and still more definitively desiring to avoid any possible appropriation of his varied antiquarian lore; I was, I felt, placed in a delicate position, I came to the work as a simple amateur, he had been professionally entertained as the Government "Archæological Enquirer."

Such members of our Society, as were then present in Calcutta, will call to mind that shortly after this, on his way homeward, Major Kittoe delivered a lecture on Sárnáth, at one of the Society's monthly meetings. No résumé of this discourse has as yet been embodied in *our* transactions—and otherwise I fear that of the



extensive collection of relics and ancient objects—of the varied accumulation of drawings, facsimiles and transcripts of antiquarian remains, made with such accurate nicety, by that devoted admirer of things of olden time—but little is now left that is readily susceptible of publication.

I should not now have ventured into the pages of the Journal Asiatic Society of Bengal as the unprepared exponent of immature theories or the mere chronicler of certain lines of old walls, uncovered in continuation of previous operations, had it not been, that on my departure from Benares, feeling myself bound to submit to the late Mr. Thomason a report of the progress, such as it was, that had been made in an undertaking he had expressed a lively interest in, and which had been carried on not only under the auspices, but with the direct aid of Government, I forwarded to his honor, as the result of my temporary superintendence, my original sketch plan of the excavations, corrected and added to, as it had been, from time to time as new walls or chambers were unearthed. This rough outline was accompanied by a private note alluding to the limited discoveries made, and suggesting the most favourable direction for future exploration, should opportunity offer for continuing operations. In short, I submitted a mere working plan of the present state of the diggings, with brief explanatory MS. references. Mr. Thomason did me the honor to place these imperfect documents on Official record, and at the same time expressed a wish, that a notice on the subject should be published in this Journal.

It is in fulfilment of that desire, that I now, at the eleventh hour, under the pressure of heavy public duties—forward this sketch. The ground plan of the inner square of the Monastery is sufficiently illustrated in the accompanying lithograph, an imperfect idea of the elevation may be gathered by observing the depth of the various walls noted on the plan—but the general profile of the inhumed edifice and the covering débris require momentary notice.

The excavations already completed, viewed with reference to the substances of which the covering bodies were severally composed—tends to show that previous to the erection of the comparatively modern building (colored *lake* in the lithograph) with which we are more immediately concerned—and without at present adverting to





the lower walls (distinguished by *neutral tint*), the general line of the original bank sloped from east to west and that the later monastery was erected on the slope of the shelving bank forming the westward face of the *Khérah* or natural mound, to the extreme eastward of which is situated the celebrated *Tope*, which dates from a far earlier period.\*

The outline profile therefore of that portion of the accumulations, which served to fill in the higher but unequal line of the broken walls now exposed, formed, by subsequent deposits, a mere continuation to the westward of that face of the original bank, taking however a more gradual slope than the sides of the clean earth mound appear to have done.

In brief summary of the nature of the materials removed during the progress of the excavations, I may note unmixed earthen soil

\* Major Cunningham in reply to my enquiries regarding his extensive Sárnáth researches of older days, sends me the following items of information :

‘When I got your letter I could not lay my hands upon my Sárnáth papers, and when I did find them, there did not appear to be any thing that would be of use to you. I opened the great *Tope* in January, 1835 : and made numerous excavations all round it. I cleared out the remains of the *Tope*, in which Jagat Singh, the Dewán of Cheit Singh, had found the relics—and I drove a shaft down the centre of the large brick *Tope* called Chokaudi. I found about one hundred statues and bas reliefs, of which all that were worth preserving were presented by me to the Asiatic Society of Bengal.

‘Connected with Sárnáth there are two great facts which should be brought prominently forward. The first is the size of the building, which Wilford has stated to be 50 feet high, and which Wilson and others have repeated—whereas it is 110 feet high above the ruins, and about 130 feet above the plain, I measured it with a theodolite, 109 feet 10 inches, and afterwards with an iron chain, when I had finished the scaffolding, 110 feet.

‘The other point regarding Sárnáth is its age, and here again Wilford has misled every one. The inscription which he published was found by *Jagat Singh*, and removed to the tank at *Jagatganj*, where Kittoe afterwards found it. This inscription is on the pedestal of a statue and bears reference only to the erection and dedication of the statue in the tenth century, and has no connexion whatever with any of the *Topes*. The great *Tope*, to judge by the alphabetical characters of the inscribed slab which I found inside it must date as early as A. D. 600—700—and I feel certain that it is the very lofty *Tope* seen by Hwan Thsang in A. D. 640 in the Deer Park. As *Sárang* is a Deer, perhaps Sárnáth may be only a contraction of Sáranganáth.’



at the line indicated by the letters *N. W.* at the S. East corner of the clearings. The modern half-wall, erected upon the remains of the more ancient edifice, was evidently built into an already existing bank consisting, at the point of contact, of a *débris* of broken bricks, &c.

The masonry of this wall is regular on the inner face, forming the one side of the small chamber—but is left rough and irregular on the surface covered by the bank—the chambers on the eastern side of the square were found filled in with a strange medley of uncooked food, hastily abandoned on their floors—pottery of every day life, nodes of brass produced apparently by the melting down of the cooking vessels in common use—above these again were the remnants of the charred timbers of the roof—with iron nails still remaining in them—above which again appeared broken bricks mixed with earth and rubbish to the height of the extant wall, some 6 feet from the original flooring—every item here bore evidence of a complete conflagration and so intense seems to have been the heat that in portions of the wall still standing the clay, which formed the substitute for lime in binding the brickwork, is baked to a similar consistency with the bricks themselves. In short, all existing indications lead to a necessary inference that the destruction of the building, by whomsoever caused, was effected by fire applied by the hand of an exterminating adversary, rather than by any ordinary accidental conflagration. Had the latter been the cause of the results now observed, it is scarcely to be supposed that so well-peopled a convent, so time-hallowed a shrine, should have been so hastily and completely abandoned. In front of these chambers we see traces of a verandah, and, at the N. east corner, we again observe the ancient walls performing the part of foundations for their modern successors; there would seem to have been an outlet from the main square at this point, though as far as the excavations have yet been extended in this direction, it is difficult to say where this passage led to, inasmuch as on the east we encounter a mere retaining wall, supporting a corner of the high bank—and on the north we meet with a singular elbow-shaped superficial continuation of the outer wall of the main building; what this strange angular affair may indicate, or how far it may extend into the bank must for the present be allowed to pass.

The outline of the complete square will however, be seen to have been preserved, as far as the foundations go, to the outside of the doorway-block, and the line is further continued through the thick angular wall, at which point the deep foundations cease. Passing by three ordinary chambers on the northern face, we come to one of the image houses—the entrance is from the inner square—the brick and the stone platform may both be supposed to have formed pedestals of erect statues of Buddha; the retreated wall in the corner, between these platforms, combined with the otherwise apparently isolated position of the second platform chamber adjoining towards the north, would have led to the idea that the wall had been pierced for the purpose of communication between one chamber and the other, but as far as the standing walls admit of a decision on the point, there certainly was no doorway at this spot, whatever means of oral or ocular communication may have existed in the screen at a higher level.

Such portion of the western face of the Monastery as has yet been exposed seems to have consisted of cells. These bear less trace of fire than those on the opposite side of the square, but on the other hand a much smaller proportion of their walls remains standing, seeming as if this side of the building, situated as it was on the more exposed slope of the bank, was less early inhumed; indeed as far as can be seen the S. W. corner has been almost entirely swept away, its surviving portions having been covered in at a much later period by the gradual operation of the manufacture of pottery, &c., whose kilns for the supply of successive generations have been pushed on in this direction to meet the prevailing wind. At this corner we again find traces of the verandah of the court and the centre chamber on the southern aspect brings us to the shrine: all that now remains, is the square, elaborately-corniced block in the centre of the chamber, which formed the *Singhásun* or throne for the seated figure of Buddha. The wall to the rear of the statue has been completely destroyed, but the original opening in front of the *Singhásun* is seen to have been enlarged beyond the breadth of the other doorways, probably to afford a free view of the object of worship without necessitating too near an approach on the part of the ordinary votaries.

I now proceed to notice such objects of interest as have been met with during the operations.

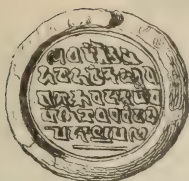
Most prominent among these are the small *chaityas* depicted as figs. 6 and 7. Fig. 6, displays the *chaitya* as deposited in its complete state, its seal inscription of fragile clay encircled by and preserved within the mass of subsequently baked clay, which itself is adapted to a religious form of outline; fig. 7, shows the offering when subjected to the hammer of the curious antiquary and develops to us the clay seals, of which 1, 2 and 3, offer varieties. These examples contribute the only three modifications in the style of writing that I have been able to detect, amid the produce of several hundreds of *chaityas*. I had designed that the engravings should show the precise variations of the form of alphabet and exhibit the style of execution peculiar to each, but I must confess that I cannot pretend to illustrate my theme with such imperfect representations as Calcutta Lithography supplies; indeed, to own the truth, I myself have been obliged to refer in many instances to nearly identical originals in my own possession in order to discover what letters the artist designed to express! As the supposed facsimiles will not admit of my readers forming an opinion of the age of this writing, nor for my illustrating its variations, I shall content myself with remarking that Col. Sykes\* assigns the Palæography to *any* period "between the 7th and 10th centuries," an open proposition enough, and one we need not now contest!

The entire number of these diminutive prayer temples seem to have been placed as votive offerings in one and the same position, to the right front of the chief figure of Buddha, on the spot indicated on the plan by a double cross within a circle. Whether however this was the appropriate spot,—so far removed from the statue—for the deposit of the pilgrims offering, or whether, when once dedicated at the shrine itself, the officiating priests considered this site of sufficient proximity for absent worshippers' leavings, may be a question; but the little varying uniformity of the character and execution of the legends contained within the *chaityas* would seem to indicate that they were manufactured *on the premises*, or at all events, that the ruling hierarchy had a beneficial interest in the trade, and pos-

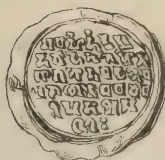
\* Athenæum, 5th February, 1853.



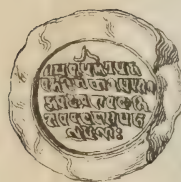
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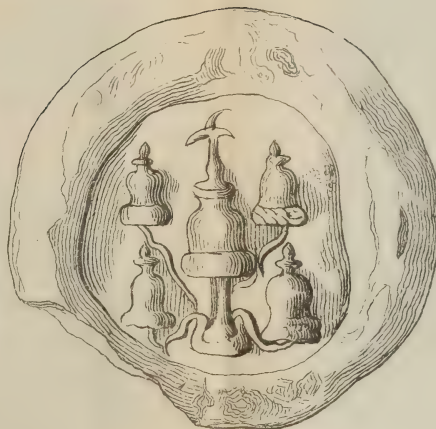
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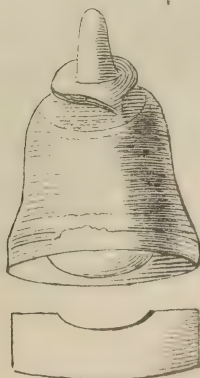
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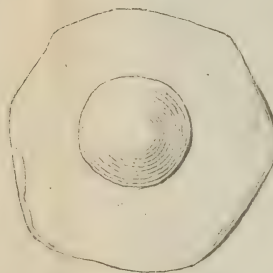
6



7



7







sibly went so far as to make the site above indicated a location for sale and delivery at an opportune pitch of devotional excitement on the part of the confiding votary! Besides the three varieties of *inclusive chaityas* there were found specimens of a more primitive form of the same manufacture in which the entire mould of clay seemed to have been prepared at one and the same operation, and after the external outline had been received. The impression was made by forcing the engraved seal into the soft clay from the base of the *chaitya*: in this case the inscription remained comparatively unprotected, but the manipulative process was more simple and possibly more assuring to the mass, who were then enabled to see the writing that was to aid their act of worship.

The inscription itself conveys the sacred formula of the Buddhists: the Indian specimens of the legend are usually faulty in their orthography. I annex a literal transcript of the favourite version at Sárnáth, merely giving Professor Wilson's authoritative declaration of its meaning, and referring the reader to the Journal of the Asiatic Society of Bengal, Vol. IV. p. 132 and p. 51, *Ariana Antiqua*.\*

The flat clay cake No. 4, afforded the purchaser an opportunity of making at a single offering a display of twenty figured chaityas and possibly in this strange religion, where water wheels now say prayers for a village community, the one expressed formula may have been supposed in its association to have twenty vehicles for its enunciation!

Figure 5 offers a more humble variety of the same species of impression, having five *chaityas* only and no inscription.

These last were found promiscuously mingled with the débris in the open court, generally at the level of the original surface, showing that their date is not later than that of the destruction of the building itself.

The Lithographed plan indicates the various places where food was

\* Sanskrit version.

ये धर्महेतु प्रभ  
वा हेतु तेषा तथा गतो  
द्य वदतेषा च योनि  
रोध एवं वादी मद्वा

अमणः

Wilson's Translation.

The Tathágata (Buddha) has declared the causes which are the origin of moral merit: what is its obstruction also the great ascetic has explained!

discovered, and I believe Major Kittoe met with the remains of ready-made wheaten cakes in the small recess in the chamber towards the N. E. angle of the square. I can myself assert that on the floor of the cell marked 3, ⊕, a large quantity of rice was found, together with portions of wheat and other grain, part of which was spread out, or possibly scattered at the moment of the destructive inroad that was brought to a climax in the conflagration of the monastery.

A native axe of the form in ordinary use to this day was discovered, imbedded in the verandah foundation at 4, ⊕.

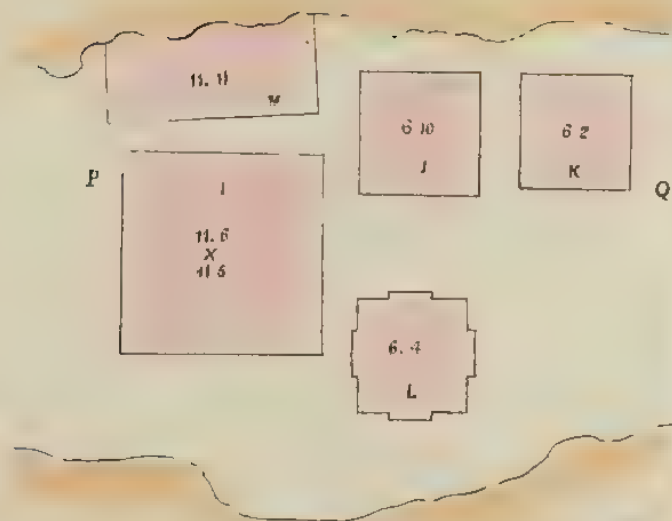
In the cells to the eastward were found, among other things, considerable masses of brass, melted up into nodules and irregular lumps as chance gave them a receptacle amid the general ruin. Here also were seen, broken or whole, the pottery vessels of every day requirement, and the iron nails which connected the cross rafters, still fixed in the larger beams that had escaped complete combustion. Among other bits of iron-work, there remained a well-fashioned ring-bolt that might pass muster at the present day; of matters of domestic utility, I must not omit to mention a clay *chirāgh* or lamp of the pointed wick-holder description, which, though it has retained its position in that form in other parts of India, is now superseded in local use by the ordinary small circular saucers of baked clay.

The whole of the somewhat miscellaneous Sárnáth collection as yet unearthed has been deposited in the Benares College.

It remains for me to advert to the plans Nos. 2 and 3. The lithograph No. 3, is an outline section of that portion of the raised mound, situated some hundred yards to the N. W. of the monastery, on which the relic tope was placed: this it will be seen was a circular building of massive strength erected in far more modern days than the large tope previously adverted to, the relics were discovered and removed, many years ago, by some of our older residents at Benares. From the inclination of the walls now standing, it is clear that the dome was not designed to follow the ordinary outline, and that if finished at all, it must have been a flat unsightly object as compared with the lofty proportions of the earlier edifice. Major Kittoe was under the impression that the visible portion of the

Nº 2.

Plan of a portion  
OF Nº 3.



East.

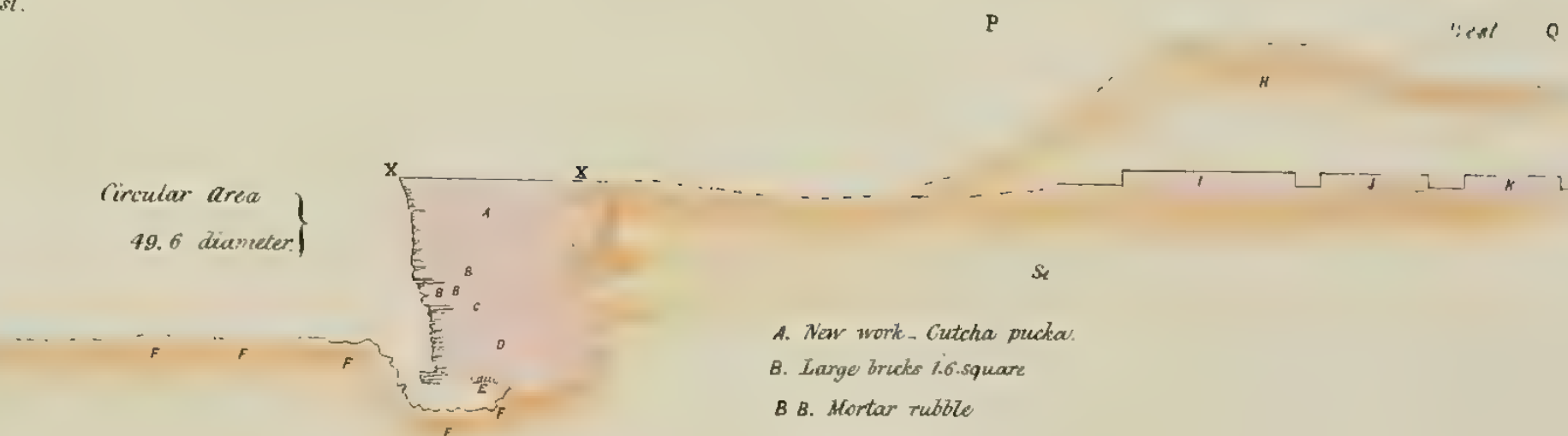
Circular Area  
49.6 diameter.

N.B. These Chubootras are Brick work, plastered  
with lime.—

The Original Statues of Budh which stood  
thereon, were found, to the number of four  
(all being of similar out line), broken near  
their pedestals.—

Nº 3.

ENTIRE SECTION OF Nº 2 ON P. Q  
AND CONTINUATION TO X. X. F. F.



A. New work - Cutcha pucker.

B. Large bricks 1.6 square

B B. Mortar rubble

C. Large bricks 1.1 square

D. Old masonry work.

E. Lime rubble below the foundation.

F. Clean earth, unmixed with foreign  
substances & previously undisturbed

H. Outline of the original Brick Kiln  
prior to excavation.—

I. J. K. L M.— Chubootras— which seemingly  
served as pedestals to the figures of Budh  
no less than four of which were found  
mutilated near the spot.—





wall formed only the upper curve of a building of considerable elevation that had been covered in process of time, and he further trusted that deep digging would reward the explorer with new relics, as in the case of the Manikyala tope. In consequence of this I sunk my excavation till I came to the absolute base of the foundation.

The notes on the plan appear to explain all that need be said about the rest of the undertaking, but I may mention that I should be disposed to assign a considerably more modern date to the platform pedestals of the statues of Buddha, than to the monastery itself.



*Examination and Analyses of Dr. CAMPBELL'S Specimens of Copper ores obtained in the neighbourhood of Darjeeling.—By HENRY PIDDINGTON, Curator Museum of Economic Geology.*

Dr. Campbell, at my request, has been good enough to send us down large despatches of twelve seers each of these ores as found, so as to enable us both to judge accurately of the nature of the rock in which they occur and to *sample* them fairly. By sampling is meant, amongst metallurgists and smelters, the taking of fair average samples from a heap of ore, so as to obtain fair results in the reduction or analysis. It is a circumstance which leads to much deception that those who forward specimens only send choice ones, and the assayers again too often neglect this process of careful sampling which is a tedious one and requires judgment and great care.

I.—*Pushak Ore.*

This ore, as sent, may be described as a tough, generally fine-grained, and slightly contorted hornblende slate; passing into a massive hornblende rock; the copper and iron pyrites being dispersed through it, or sometimes in laminae, like the mica in gneiss. Generally the whole may be called a pyritous hornblende slate.

There are also a few specimens of copper and iron pyrites in a hard quartzose micaceous rock intersected by thicker laminae of hornblende. This rock I should, call a tough, pyritous, hornblendic mica slate.

There are also a few specimens of contorted mica schist with a little pyrites.

A careful sample of all these ores gave in 1,000 grains.

|                                   | Grains. |         |
|-----------------------------------|---------|---------|
| Earthy Silicates, .....           | 856.00  |         |
| Per. Ox. Iron, .....              | 113.00  |         |
| Bismuth, .....                    | 7.00    |         |
| Protox. Copper, .....             | 17.12   | Copper. |
|                                   |         | 13.57   |
|                                   | <hr/>   |         |
|                                   | 993.12  |         |
| Loss (principally Sulphur), ..... | 6.88    |         |
|                                   | <hr/>   |         |
|                                   | 1000.00 |         |
|                                   | <hr/>   |         |

Hence the pyrites are found be principally iron pyrites with but a small per centage (of  $1\frac{3}{4}$  per cent.) of copper.

It will be observed that my analysis is one of the whole rock. No doubt far better results would be obtained by pounding and washing, but this would be a very expensive process with so tough a rock, and require the care of experienced miners, for I found that much of the pyrites had a tendency to "*wash off*," as it called, from the extreme fineness to which the scales of it are reduced in the mortar and exist in their natural state.

Altogether then, unless richer ores are found, this is not one worth working; but it may be well worth sinking a shaft (common native well-sinkers will go to a good depth in a dry soil) to see what lies below. No surface indication, rich or poor, should be taken as an index to what a mineral scite really is.

## II.—*Mungwah Ores.*

This ore is mostly, or rather wholly, Actinolite rock, white, grey and yellow brown. The dark grey specimens approach to a micaceous hornblende rock and the lighter and white ones are Tremolite; all varieties of hornblende. The rock contains every where specks and nests of pyrites, and in some specimens minute nests of magnetic iron ore. 1,000 grains of this rock, from about a pound of it carefully

sampled, gave nothing but iron, and traces only of copper, just sufficient to colour the ammoniacal solution.

### III.—*Punkabbari Ores.*

A compact and tough, massive, and fibrous hornblende rock; with promising nests of pyrites (as to size) interspersed, but on examination it was found to be exactly the same as the foregoing No. II. affording a mere trace of copper only.

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### A Monograph of the Indian species of *PHYLLOSCOPUS* and its immediate affines.—By EDWARD BLYTH.

There is no group of birds more difficult to the student of Indian Ornithology, than the very extensive series of small *Bec-fins*, or “Warblers,” known to the French as *Pouillots*, and in parts of England by the name of *Pettychaps*. It is exemplified in Europe by four well known species;\* and as an *avis rarissima* in Europe, the common Indian *Motacilla proregulus*, Pallas (*Regulus modestus*, Gould), which strictly appertains to the series under review, has

\* 1. *PHYLLOSCOPUS SIBILATRIX*; *Motacilla sibilatrix*, L.: *Sylvia sylvicola*, Latham. Type of *SIBILATRIX*, Kaup.

2. *PH. BONELLI*; *Sylvia Bonelli*, Vieillot: *S. Nattereri*, Temminck.

3. *PH. TROCHILUS*; *Motacilla trochilus*, L.: *Sylvia fitis*, Bechstein: also, according to M. Degland, *S. icterina*, Temminck (nec Vieillot); *S. flaviventris*, Vieillot; *S. angusticauda*, Gerbe; and *S. tamarixis*, Crespigny.

4. *PH. RUFUS*; *Curruca rufa*, Brisson: *Sylvia collybita*, Vieillot; *S. loquax*, Herbert; and by the older British ornithologists erroneously assigned to *Motacilla hippolais*, L.

In addition to these four, in N. Africa, Dr. Rüppell describes—

*PH. UMBROVIRENS*; *Sylvia umbrovirens*, Rüppell (described but not figured in his *Neuen Wirbelthieren*, Vogel, p. 112). From Abyssinia.

*PH. BREVICAUDATUS*; *Sylvia brevicaudata*, Rüppell, *Atlas*, t. 35. From Kordofan.

Another that will probably have to be added to the European fauna is

*PH. BREVIROSTRIS*; *Sylvia brevirostris*, Strickland, *P. Z. S.* 1836, p. 98. Procured at Smyrna. Differs from *PH. RUFUS* in its greater size, and from *PH. TROCHILUS* “in the shortness of the beak, and the dark colour of the legs.”

Lastly, two species are briefly described in Dr. Horsfield’s Catalogue of Javanese birds, *Trans. Lin. Soc.* xiii. 156; neither of which can we identify with Indian species: viz.



been obtained in Dalmatia and in Britain; while three of the European species have been stated to occur in India, but at a time when the various Indian *Pouillots* were undescribed and the multiplicity of distinct species of them was unsuspected. As neither of them, however, would appear to have been met with in the country since the numerous Indian species have been recognised, we are led to infer that certain other species were mistaken for them; and it is highly probable that the *Sylvia sibilatrix* of Dr. Royle's list\* refers to our PH. NITIDUS, and Mr. Gould's *S. trochilus* of W. India† to our PH. VIRIDANUS; and perhaps M. Temminck's *S. trochilus* of Japan may likewise prove to refer to some nearly affined species, which he failed to distinguish from the *trochilus* of Europe.‡

The Indian species have been described under various generic names; and even now it would not appear that systematists are agreed whether to range the accepted typical form, that of *Motacilla trochilus*, L., under PHYLLOPNEUSTE of Meyer (1822), which included also the distinct form of *Mot. hippolais*, L., regarded

PH. JAVANICUS; *Sylvia javanica*, Horsfield: seemingly affined to our PH. MAGNIROSTRIS. And

PH. MONTANUS; *Sylvia montana*, Horsfield: apparently affined to our PH. TRISTIS. Of PH. MONTANUS, (Horsf.), the late lamented Hugh E. Strickland informed us, that "the wing is 2 in. long, gradated, with the fifth quill longest."

Mr. Strickland adds, from Java,—

PH. TRIVIRGATUS; *Sylvia trivirgata*, Temminck: a species referable to Mr. Hodgson's Group ABRERNIS; and it is probable that others of this minor group, from the Archipelago, remain to be described.

\* *Ill. Him. Bot. Introd.* p. lxxvii. In this list are enumerated "SYLVIA SIBILATRIX, S. RUFA (plains), S. TROCHILUS, and several species undetermined." It is not probable that either of the names specified is correctly applied; nor certain others in the same list, as especially GALLUS SONNERATII!

† *Proc. Zool. Soc.* 1805, p. 90.

‡ Some Japanese birds which we saw with Mr. Gould, sent by M. Temminck, and identified by him with European species, certainly presented differences more or less marked. We especially remember the Japanese Robin, Jay, and Bullfinch. The last is probably PYRRHULA GRISEIVENTRIS, Lafresnaye, *Rev. Zool. de la Soc. Cuv.* 1841, p. 241.—Since this note was penned, we have seen Mr. Gould's figure of the Japanese Bullfinch, in his 'Birds of Asia,' where it is designated P. ORIENTALIS, Temminck and Schlegel. The Jay, too, is cited by the Prince of Canino as GARRULUS JAPONICUS.

by Mr. G. R. Gray (in 1841) as typical of PHYLLOPNEUSTE,—or in PHYLLOSCOPUS, Boie (1826), of which *M. trochilus* is cited as typical. In M. Degland's 'Ornithologie Européenne' (1849), *M. hippolais*, L., with three European congeners is referred to HIPPOLAIS, Brehm (1828), the typical species being termed H. POLYGLOTTA, (Vieillot); and *M. trochilus* and its congeners are assigned to PHYLLOPNEUSTE. An older name than HIPPOLAIS, Brehm, occurs, however, in FICEDULA, Koch (1816), which is adopted by Dr. Rüppell for the *Pouillots*,\* and by Dr. Schlegel for both groups;† but it is faulty as implying these birds to be fig-eaters (or *Beccaficos*), whereas all of the series are exclusively insectivorous, and in no way to be confounded with the highly frugivorous Fauvettes.‡

In former papers, we followed Mr. Gray's arrangement, but with this error, that certain Indian species were assigned to PHYLLOPNEUSTE apud Gray (v. HIPPOLAIS, Brehm); whereas upon referring to the characters of this genus, as specified by M. Degland, we find that we had misapprehended it, and incline now to suspect that with it should be united the divisions CULICIPETA, nobis, and ABRORNIS, Hodgson.

In a series of 22 species actually before us, excluding REGULUS, we observe that one only, the European PHYLLOSCOPUS SIBILATRIX (type of SIBILATRIX, Kaup), is remarkable for the comparative great length of its wings; whereof the first primary is minute and the second is nearly as long as the third. In all the rest, the small first primary is considerably less diminutive, and the second is much shorter than the third: the proportions varying, however, to some extent, and the wing being more or less rounded in different

\* *Systematische uebersicht der vogel nord-ost Afrika's* (1845), p. 57.

† *Revue Critique des Oiseaux d'Europe* (1844), pp. xxv, -vi.

‡ The four European species described by M. Degland under HIPPOLAIS are as follow:—

1. H. POLYGLOTTA; *Motacilla hippolais*, L.; *Sylvia polyglotta*, Vieillot: *H. salicaria*, Bonap.

2. H. ICTERINA; *Sylvia icterina*, Vieillot (nec Temminck): *S. hippolais* apud Temminck, *Manuel*, 2nd edit., (1820).

3. H. OLIVETORUM; *Sylvia olivetorum*, Strickland.

4. H. ELAICA; *Salicaria claica*, Lindermayer: *Ficedula ambigua*, Schlegel.

species; affording a good differential character in several instances. In general, the wings are shorter and more rounded than in the European PH. TROCHILUS: but looking to the *ensemble* of characters, it seems doubtful whether more than three divisions can be retained in the whole series under review. These are PHYLLOSCOPUS, certain species of which (constituting the *Reguloides*, nobis,)\* offer a close approximation to REGULUS, and serve to indicate the true systematic position of that genus,—REGULUS (which M. Degland and others have arranged near PARUS),—and CULICIPETA (including ABRORNIS), which should perhaps be merged in PHYLLOPNEUSTE (v. HIPPOLAIS). Under these three groups only, we now comprise the following Indian species.

I.—Genus PHYLLOSCOPUS, Boie, apud G. R. Gray. Type MOTACILLA TROCHILUS, L.†

1. PH. RAMA; *Sylvia rama*, Sykes, *P. Z. S.* 1832, p. 89. There appear to be two races of this bird, differing a little in shade of colour, but in no other particular that we can discern. The bill is rather thicker and the form less slender than in most others of the genus; and together with the colouring, approximate it to CALAMOHERPE, Boie, for a species of which it might be mistaken at first sight;‡ but the form of the wings and tail, and general character, sufficiently indicate its true position to be as here arranged.

\* *J. A. S.* XVI, 442.

† A better *average* type exists in PH. RUFUS, v. *Curruca rufa*, Brisson.

‡ We have three Indian species of CALAMOHERPE, all distinct from those of Europe.

1. C. BRUNNESCENS; *Agrobates brunescens*, Jerdon. Very like the European C. ARUNDINACEUS (*Turdus arundinaceus*, L.; *Sylvia turdoides*, Meyer); but easily distinguished by the form of the wing, in which the second or first developed primary is constantly  $\frac{1}{4}$  in. shorter than the next, and the third, fourth, and fifth are subequal.

2. C. DUMETORUM, nobis, *J. A. S.* XVIII, 815.

3. C. AGRICOLA, Jerdon, *Madr. Journ.* XIII, pt. II, p. 131; *J. A. S.* XIV, 595. This much resembles the European C. SALICARIA (*Motacilla salicaria*, Gmelin; *C. alnorum*, Brehm; *Mot. arundinacea*, Lightfoot); but is readily distinguished from it, as is also C. DUMETORUM, by the same difference in the proportion of the primaries as exists in the species before cited.

The three Indian species of CALAMOHERPE accordingly tend to approximate PHYLLOSCOPUS in the form of the wing, and they have also less aquatic habits than their European congeners.

Length 5 in., by  $7\frac{1}{2}$  in. in alar expanse: wing  $2\frac{3}{8}$  to  $2\frac{1}{2}$  in.; 1st primary  $\frac{9}{16}$  in., the second  $\frac{5}{8}$  in. shorter than the third, which about equals the 4th and 5th: tail  $2\frac{1}{8}$  in.; its outermost feather  $\frac{1}{8}$  in. shorter: bill to gape  $\frac{5}{8}$  in.: tarse  $\frac{3}{4}$  in. Irides dark. Bill dusky above, light carneau below: legs light brown, tinged with plumbeous on the joints. Plumage, above uniform light greyish-brown; below pale or albescent, passing to white on the chin, middle of belly and vent: lores, continued as a slight streak passing over the eye, and the orbital feathers, pale.

This bird is very common in Lower Bengal during the cold season, upon sandy soil above the tideway of the rivers; haunting baubul topes and scattered trees near villages, as well as hedges and bush-jungle. Those of S. India have a slight ferruginous tint throughout; but we can detect no further difference. It would not appear to inhabit the sub-Himalayan region.

2. PH. MAGNIROSTRIS, nobis, *J. A. S.* XII, 966: *Phyllopneuste indica*, nobis, *J. A. S.* XIV, 593: *Ph. trochilus*? apud Hodgson, *Gray, Zool. Misc.* 1844, p. 82.

Length 5 to  $5\frac{1}{4}$  in., by  $8\frac{1}{4}$  in. across: wing  $2\frac{5}{8}$  to  $2\frac{3}{4}$  in., its first primary measuring  $\frac{3}{4}$  in., and the second being  $\frac{7}{16}$  in. shorter than the third, which does not quite equal the 4th and 5th: tail 2 to  $2\frac{1}{8}$  in., its two outer feathers on each side very slightly graduating: bill to gape  $\frac{5}{8}$  in.: tarse  $\frac{3}{4}$  in. Irides dusky. Bill dusky plumbeous above, fleshy horn-colour at base of lower mandible. Legs albescent plumbeous. Plumage, duskyish or infuscated olive-green above, having a faint tinge of tawny, especially on the wings and tail; the medial larger coverts of the wings being tipped with albescent-greenish: a narrow but conspicuous pale yellowish supercilium, and the lower ear-coverts are partly of the same hue: under-parts pale; the breast tinged with ashy, mingled with faint yellowish; and the rest of the lower-parts are more or less of a purer yellowish-white. The tawnyish hue of the wings and tail resembles that of the upper-parts of the European PH. RUFUS, whence the name of the latter species.

The species appears to be generally diffused over the country, and we have seen specimens from the eastern coast of the Bay of Bengal, and also one from Chusan. We have been informed that it has a pleasing song.



3. PH. LUGUBRIS, nobis, *J. A. S.* XII, 968. Length  $4\frac{3}{4}$  to  $4\frac{7}{8}$  in., by  $7\frac{1}{2}$  in. across: wing  $2\frac{1}{2}$  in.; first primary  $\frac{3}{4}$  to  $1\frac{3}{8}$  in., and the 2nd  $\frac{5}{16}$  in. shorter than the third, which does not quite equal the 4th and 5th: tail  $1\frac{7}{8}$  in., subeven. Bill to gape nearly  $\frac{5}{8}$  in. Tarse  $\frac{3}{4}$  in. Irides dusky. Bill dusky above, and also on the medial part of the lower mandible; the rest amber-coloured. Legs pale greenish-dusky. Plumage, above dusky olive-green, nearly as in the last species, but without the tawny shade; also a similar pale yellowish supercilium, and tips to the medial wing-coverts: below albescent, faintly tinged with yellow medially, and laterally with the hue of the flanks.

Common in Lower Bengal during the cold season, and more or less so over the country generally.

4. PH. AFFINIS; *Motacilla affinis*, Tickell, *J. A. S.* II, 576: *Ph. flaveolus*, nobis, *passim*; *Abrornis xanthogaster*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82. Length  $4\frac{3}{8}$  to  $4\frac{1}{2}$  in., by  $6\frac{1}{2}$  to 7 in. in expanse: wing  $2\frac{1}{8}$  to  $2\frac{3}{8}$  in.; having the 1st primary  $\frac{3}{4}$  in., and the second  $\frac{5}{16}$  in. shorter than the third, which almost equals the 4th and 5th: tail  $1\frac{3}{4}$  to  $1\frac{7}{8}$  in., its outermost and penultimate feathers very slightly graduating: bill to gape  $\frac{1}{2}$  in., or a trifle more: tarse  $\frac{3}{4}$  in., or nearly so. Irides dark. Bill dusky above, amber-coloured below: legs pale brownish-dusky, tinged with yellow; the soles more or less yellowish. Plumage, above fuscous olive-green, with an extremely faint tawny tinge; no pale tips to the medial wing-coverts: supercilia, cheeks and under parts, pale sullied yellow, brightest on the middle of the belly, with a slight tawny tinge in some, and the breast and flanks a little infuscated.

This species might be supposed to be the young of the preceding, in corresponding yellowish garb to the young of PH. TROCHILUS and PH. RUFUS; but on minute comparison of freshly killed specimens, they are seen to be distinct. The bill is more feeble, and much more compressed, in PH. AFFINIS; whereas in PH. LUGUBRIS it is very little compressed, and the rictal setæ are considerably more developed. The colour of the legs is also very different, being in LUGUBRIS pale greenish-dusky, while in AFFINIS there is a strong tinge of brown. From examination of a great number of specimens, we feel convinced that the colouring here described is permanent.

The species is common in Lower Bengal, more so above the tideway of the rivers, and we believe that it is generally distributed over India.

5. PH. INDICUS; *Sylvia indica*, Jerdon, *Madr. Journ.* XI, 6: *Ph. griseolus*, nobis, *J. A. S.* XVI, 443.

Length  $5\frac{1}{4}$  in., by  $7\frac{1}{4}$  in.: wing  $2\frac{5}{8}$  in.; having the first primary  $\frac{7}{8}$  in. long, and the second  $\frac{3}{8}$  in. shorter than the third, which equals the sixth, and is scarcely shorter than the fourth and fifth: tail 2 in.: bill to gape  $\frac{9}{16}$  in.: tarse  $\frac{3}{4}$  in. Irides very dark brown. Bill dusky above, below pale amber: interior of the mouth whitish, with scarcely a tinge of yellow. Tarse externally and the toes above, light brown; internally and beneath, yellow. Plumage, above uniform dull ash-colour, without a tinge of green: supercilia, clear pale yellow: lower-parts pale dull yellowish, purer on the middle of the belly, and the rest more or less tinged with dull tawny.

This species appears to be found chiefly in the peninsula of India, and is rare in Lower Bengal.

6. PH. FUSCATUS, nobis, *J. A. S.* XI, 113: *Ph. brunneus*, nobis, *J. A. S.* XIV, 591, (the young).

Length 5 to  $5\frac{1}{4}$  in. by  $7\frac{1}{8}$  to  $7\frac{3}{8}$  in.: wing  $2\frac{1}{4}$  to  $2\frac{3}{8}$  in.; having the first primary  $\frac{13}{16}$  to  $\frac{15}{16}$  in., and the second  $\frac{5}{16}$  in. shorter than the third, which equals the 6th and is a little shorter than the 4th and 5th: tail  $2\frac{1}{8}$  in., with its outermost feathers  $\frac{3}{16}$  in. shorter than the middle ones: bill to gape nearly  $\frac{5}{8}$  in.: tarse  $\frac{7}{8}$  in. Irides dark hazel. Bill dusky above, yellowish at base of lower mandible; inside of the mouth rather pale yellow: legs greenish-brown. Plumage, above uniform olive-brown; below albescent, purest on the throat and middle of belly, and weakly tinged with a ferruginous or ruddy hue on the pale supercilia, sides of neck, flanks and lower tail-coverts, and more faintly on the breast; axillaries also weak ferruginous, with the fore-part of the under-surface of the wing; and the primaries are slightly margined with pale rufescent: no trace whatever of a wing-band. The young (*Ph. brunneus*, nobis, *passim*.) resemble the adults in colour, but the wings and tail are rather shorter, and the plumage is of somewhat more open texture.

Not rare in Lower Bengal during the cold season; but commoner, it would seem, to the eastward, and especially in Arakan.

7. PH. VIRIDANUS, nobis, *J. A. S.* XII, 967 :\* *Abrornis tenuiceps*, Hodgson, Gray, *Zool. Misc.* 1844, p. 83. (Perhaps PH. TROCHILUS of W. India apud Gould).

Length  $4\frac{3}{4}$  to  $5\frac{1}{8}$  in., by  $7\frac{1}{4}$  to  $7\frac{1}{2}$  in. : wing  $2\frac{1}{4}$  to  $2\frac{1}{2}$  in. ; its first primary  $\frac{5}{8}$  to  $\frac{3}{4}$  in., and the second  $\frac{1}{4}$  in. shorter than the third, which equals the fourth and fifth : tail  $1\frac{3}{4}$  to 2 in. Bill to gape nearly  $\frac{5}{8}$  in. : tarse  $\frac{11}{16}$  to  $\frac{3}{4}$  in. Irides dusky. Bill dusky horn-colour above, the under mandible yellowish except towards tip. Legs pale greenish-plumbeous. Plumage, above light dull olive-green, beneath greenish-albescent : a pale yellow streak over the eye ; and a slight whitish bar on the wing, formed by the tips of its larger coverts.

The commonest species of the genus in Lower Bengal ; and we believe generally diffused. The only sound we have heard it utter is a faint *tiss-yip* frequently repeated ; but never a number of times in continuous succession, like the much louder *tsih-tseh* of the European PH. RUFUS.

8. PH. NITIDUS, nobis, *J. A. S.* XII, 965 : *Muscicapa nitida* (?), Latham, Franklin : *Sylvia hippolais* apud Jerdon, *Madr. Journ.* XI, 6 ; *Hippolais Swainsoni*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82. (Probably *Sylvia sibilatrix* of Royle's list.)

Length  $4\frac{1}{2}$  to  $4\frac{3}{4}$  in., by  $7\frac{3}{8}$  to  $7\frac{1}{2}$  in. across : wing  $2\frac{3}{8}$  to  $2\frac{5}{8}$  in. ; having the first primary  $\frac{1}{16}$  to  $\frac{5}{8}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the fourth and exceeds the fifth : tail  $1\frac{7}{8}$  to 2 in. : bill to gape  $\frac{5}{8}$  in. ; and tarse  $\frac{3}{4}$  in. Irides dark. Bill carneous-dusky, the lower mandible pale ; and legs light brownish, tinged with yellow on the toes. Plumage, above of a much livelier green than in any of the preceding, resembling that of the European PH. SIBILATRIX ; below unsullied pale yellowish, brightest about the breast ; and there is a pale wing-band, formed by the tips of the larger coverts of the secondaries.

This pretty species appears to be very generally distributed, but is somewhat rare in Lower Bengal.

9. PH. TRISTIS, nobis, *J. A. S.* XII, 966 : *Sylvia trochilus* apud Jerdon, *Madr. Journ.* XI, 6.

\* *Phyllopneuste rufa* apud nos, *J. A. S.* XI, 191 ; and *Ph. affinis*, *Ann. Mag. N. H.* 1843, pt. 2, p.

Length  $4\frac{1}{2}$  to 5 in.,  $6\frac{1}{2}$  to  $6\frac{7}{8}$  in. ; of wing  $2\frac{1}{8}$  to  $2\frac{1}{2}$  in. ; the first primary  $\frac{3}{4}$  in. (in large specimens), and the second  $\frac{1}{4}$  in. shorter than the third, which equals the fourth and fifth : tail  $1\frac{3}{4}$  to 2 in. : bill to gape  $\frac{1}{2}$  in. ; and tarse  $\frac{9}{16}$  to  $\frac{3}{4}$  in. Irides dark. Bill blackish, tinged with yellow at base of lower mandible ; and gape also yellow : legs dull black. Plumage, above uniform dull brown : below albescent, with a faint tinge of ruddy or ferruginous on the pale supercilia, sides of neck, breast and flanks ; and no tinge of yellow except on the axillaries and fore-part of the wing underneath, which are almost pure light yellow. Bill small and slender.

A common species, and generally diffused. We once observed it in great abundance, together with *CALAMOHERPE AGRICOLA*, haunting low bushes near the Calcutta salt-water lake.

10. *PH. OCCIPITALIS* ; *Phyllopneuste occipitalis*, Jerdon, nobis, *J. A. S. XIV*, 593.

Length  $4\frac{3}{4}$  in. : of wing  $2\frac{5}{8}$  in. ; the first primary  $\frac{3}{4}$  in., and the second  $\frac{5}{16}$  in. shorter than the third, which nearly or quite equals the fourth and fifth : tail 2 in., even or squared. Bill to gape  $\frac{5}{8}$  in. Tarse  $\frac{11}{16}$  in. Alar and caudal feathers unusually firm. Bill light dusky above, pale below : legs pale. Plumage, above mingled green and ashy, the latter prevailing on the back, the former on the rump, wings and tail ; crown dusky, with whitish supercilia, and a conspicuous pale medial line, broader and tinged with yellow at the occiput : a slight but distinct yellowish-albescent wing-band ; the fore-part of the wing brightish green ; and its margin, with the axillaries, pure light yellow. Lower-parts albescent, mingled with yellowish, and very faintly tinged with ruddy. Inner webs of the three outer tail feathers on each side narrowly bordered with white, the ante-penultimate less so.

This pretty species we have only seen from the Deyra Doon and from S. India. In colouring, it approximates the groups *Reguloides* and *Abornis* ; but the remarkable firmness of its wings and tail is peculiar, and prohibitive of its association with either.

The next three species (constituting the subgroup *Reguloides*, nobis,) have, like the last, a pale medial streak on the crown, and they greatly approximate the genus *REGULUS* in figure and proportions, and even in colouring (minus the developed crest) ; but their habits are those of other *PHYLLOSCOP*.



11. PH. TROCHILOIDES; *Acanthiza trochiloides*, Sundevall (1837): *Phyllopneuste reguloides*, nobis, *J. A. S.* XI, 191, XII, 963 (nec *reguloides* apud Hodgson).

Length of a male  $4\frac{7}{8}$  in., by  $7\frac{1}{4}$  in.: wing  $2\frac{1}{2}$  in.; its first primary  $\frac{11}{16}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the fifth and is a little shorter than the fourth; but, in some, these three are equal: tail  $1\frac{7}{8}$  in., even. Bill to gape  $\frac{5}{8}$  in., or nearly so. Tarse  $\frac{11}{16}$  in. Length of a female  $4\frac{1}{2}$  by  $6\frac{7}{8}$  in.; wing  $2\frac{3}{16}$  in.; and tail  $1\frac{3}{4}$  in. Irides dark. Upper mandible dusky, the lower yellow; and legs yellowish-brown tinged with plumbeous. Plumage, above dull green, a little infuscated, with two conspicuous yellowish-white bars on the wing, formed by the tips of the greater and lesser coverts: below albescent-greenish, a little tinged with yellow: a broad yellowish-white or pale yellow supercilium; and above this a broad dusky band, leaving the middle line of the crown dull green like the back, but paling at the occiput; below the supercilium the colour is also dusky: axillaries, with the fore-part of the wing underneath, yellow; and the outermost and penultimate tail-feathers have a narrow whitish margin to their inner web.

Inhabits the sub-Himalayas, and visits Lower Bengal in some abundance during the cold season. We have obtained one so late as March 15th in the vicinity of Calcutta.

12. PH. PROREGULUS; *Motacilla proregulus*, Pallas: *Regulus modestus*, Gould; and, in abraded plumage, *R. inornatus*, nobis, *J. A. S.* XI, 19, and *Ph. montanus*, Hutton, nobis, *Catal.* No. 1105: *Phyllopneuste nitidus*, Hodgson, G. R. Gray.

Length generally about 4 to  $4\frac{1}{4}$  in., by 6 to  $6\frac{1}{2}$  in. across: wing  $2\frac{1}{8}$  in.; its first primary  $\frac{1}{2}$  in.,\* and the second not  $\frac{5}{16}$  in. shorter than the third, which exceeds the sixth, and nearly or quite (in different specimens) equals the fourth and fifth: tail  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in., even. An unusually large specimen measured  $4\frac{1}{2}$  by 7 in.; wing  $2\frac{1}{4}$  in.: tail  $1\frac{3}{4}$  in. Bill to gape nearly  $\frac{5}{8}$  in.: tarse  $\frac{11}{16}$  in. Irides dark. Upper mandible dusky, the lower yellow except at tip; and legs rather pale brown, without any plumbeous tinge. Bill nearly as much compressed as in *REGULUS*. Plumage, above olive-green, brightest on the rump, wings and tail: crown dusky, with a pale mesial line,

\* In one only, of several specimens,  $\frac{5}{8}$  in.

sometimes well defined, but in new plumage not very distinct; and in much worn or abraded plumage, it often disappears altogether, and the upper-parts are then dingy greyish-brown, with scarcely a tinge of green: two conspicuous yellowish-white bars on the wing, the hinder more broad; and behind this is a dark patch, corresponding to the black seen in *REGULUS*: tertiaries conspicuously margined with whitish (as more or less in *REGULUS*), and secondaries and some of the primaries slightly tipped with the same: axillaries, with the fore-part of the wing underneath, pale yellow: supercilia and lower-parts greenish-albescent.

Common in Lower Bengal, where a few perhaps breed; but the great majority retire to the mountains for that purpose.\* As an exceedingly great rarity, it has been met with in Dalmatia and in England. Habits as in other species of *PHYLLOSCOPUS*, and not (as in *REGULUS*) gregarious: song-note nearly similar to that of *PH. SIBILATRIX*, but considerably weaker.

13. *PH. CHLORONOTUS*; *Abrornis chloronotus*, Hodgson, Gray's *Zool. Misc.* p. 82; G. R. Gray, 'Appendix to Catalogue of specimens presented by Mr. Hodgson to the British Museum,' p. 152; v. *Regulus modestus* apud Hodgson.

Resembles the last, but is smaller, with bill conspicuously shorter and darker-coloured, and the rump pale canary-yellow, strongly contrasting with the hue of the back; the median coronal line much more conspicuous, and the pale margins of the tertiaries less so. Its size is that of the European *REGULUS CRISTATUS*.

Length  $3\frac{1}{2}$  in., or a trifle more: wing  $1\frac{7}{8}$  to 2 in.; its first primary  $\frac{9}{16}$  in., the second  $\frac{1}{4}$  in. shorter than the third, which does not equal the fourth and fifth. Bill to gape about  $\frac{1}{2}$  in., and tarse  $\frac{5}{8}$  in.: tail  $1\frac{1}{4}$  in. to  $1\frac{5}{8}$  in. Upper mandible blackish, the lower pale except towards tip. Legs pale. In other respects like the last, from which it is at once distinguished by its pale pure yellow rump.

This minute species appears to be peculiar to the sub-Himalayan region, where extensively distributed.

Genus *REGULUS*, (antiqu.) Cuvier.

Capt. Hutton states that both *R. IGNICAPILLUS* and *R. CRISTA-*

\* A reputed nest, taken near Calcutta, is described *J. A. S.* XII, note to p. 965.

tus of Europe inhabit the N. W. Himalaya. We have seen only a single male specimen, procured by Capt. Thomas at Simla; and this perfectly resembles *R. CRISTATUS*, except in being considerably larger, and the fine flame-coloured interior crest would seem to be more developed. Length of wing  $2\frac{3}{8}$  in., and of tail  $1\frac{5}{8}$  in. In several British specimens of *R. CRISTATUS*, the corresponding measurements are 2 in., and  $1\frac{3}{8}$  in., with the rest in proportion. Should this difference in size prove constant, the race might be denominated *R. HIMALAYENSIS*; requiring, however, to be first minutely compared with the N. American *R. SATRAPA*, Lichtenstein (v. *tricolor*, Jardine). Mr. Hodgson would not appear to have met with a true *REGULUS* in Nepal.

Genus *CULICIPETA*, nobis, *J. A. S.* XII, 968.

“General structure of *PHYLLOSCOPUS*, but having a narrow Fly-catcher’s bill and armature of rictus, the ridge of the upper mandible angulated, and the breadth of the bill evenly attenuating.” Such are the characters of the first or typical species, to which may be added that the claws, especially that of the hind-toe, are longer and less curved. In other species, however, the form grades to that of *PHYLLOSCOPUS*; but there is a general and marked resemblance of colouring throughout the series, indicative of their unity as a group, and which would help to separate it from the European type *PHYLLOPNEUSTE* (v. *Hippolais*). In general, the upper-parts are green, the lower bright yellow wholly or in part, and the crown exhibits the colouring (variously modified) of *PHYLLOSCOPUS OCCIDENTALIS* and of the subgroup *REGULOIDES*; while the two or three outer tail-feathers are, in most of the species, largely marked with white on the inner web. Their habits appear to be quite similar to those of the *PHYLLOSCOPI*.

1. *C. BURKII*; *Sylvia Burkii*, Burton, *P. Z. S.* 1835, p. 153: *Acanthiza arrogans*, Sundevall (1837); *Cryptolopha auricapilla*, Swainson,  $2\frac{1}{4}$  Centen. (1837); *Muscicapa bilineata*, Lesson, *Rev. Zool. de la Soc. Cuv.* 1839, p. 104.

Length  $4\frac{3}{8}$  by  $6\frac{1}{2}$  in.: wing  $2\frac{1}{4}$  in.; its first primary  $\frac{3}{4}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the sixth or seventh (in different specimens), and is rather shorter than the intervening two or three: tail  $1\frac{3}{4}$  in.: bill to gape exceeding  $\frac{1}{2}$  in.;

and tarse  $\frac{11}{16}$  in. Irides dark. Bill dusky above; underneath, with the legs, pale amber or brownish-yellow, darker on toes. Plumage, above bright yellowish olive-green; below full siskin-yellow throughout; the cheeks and sides of neck intermediate: over each eye a broad black streak reaching to the occiput, leaving the middle of the head greenish, slightly flanked with ash-grey: tail dusky, its middle feathers margined with the hue of the back, and the inner web of the outermost white nearly throughout, as also the terminal half of that of the next. Some have a slight yellowish wing-band, which in others is barely indicated.

This pretty little bird is not uncommon in Lower Bengal during the cold season, and like the rest of its tribe retires to the sub-Himalayan region to breed. Its bill has more decidedly the Fly-catcher form than in any of the following.

2. *C. CANTATOR*; *Motacilla cantator*, Tickell, *J. A. S.* II, 576: *C. schisticeps*, Hodgson, Gray's *Zool. Misc.* 1844, p. 82; G. R. Gray, 'Appendix to Catalogue of specimens presented by Mr. Hodgson to the British Museum,' p. 153.

Length  $4\frac{1}{4}$  in., by  $6\frac{3}{8}$  in. expanse: wing  $2\frac{1}{4}$  in.; with primaries as in *C. BURKII*: tail  $1\frac{3}{4}$  in. Bill to gape nearly  $\frac{5}{8}$  in.; and tarse  $\frac{5}{8}$  in. Irides dark. Bill light dusky above, amber-coloured below: legs light yellowish-carneous, with a leaden tinge. Plumage, bright olive-green above, yellower on the wings and tail: throat, cheeks, supercilia, lower tail-coverts, and margin of wing, bright yellow; the belly and flanks greyish-white: greater wing-coverts tipped with pale yellow, forming a slight bar on the wing: on each side of the crown a broad black band; and an intermediate narrower greenish one, becoming yellower upon the occiput: upper tertiaries very slightly margined at the tips with yellowish-white; and the tail-feathers have a narrow yellowish-white internal border.

This pretty species is rare in Lower Bengal, becoming commoner to the westward. The bill is narrower and the rictal *setæ* are less developed, while the claws (especially that of the hind-toe) are shorter and more curved, than in *C. BURKII*.

3. *C. PULCHRA*; *Abrornis pulcher*, Hodgson, nobis, *J. A. S.* XIV, 592: *Abr. erochroa* (?), Hodgson, Gray, *Zool. Misc.* 1844, p. 82 (undescribed); G. R. Gray, Appendix to Catalogue, p. 152.



Length  $4\frac{1}{4}$  in., of wing  $2\frac{1}{8}$  in., with primaries as in C. BURKII : tail  $1\frac{3}{4}$  in. : bill to gape  $\frac{1}{2}$  in. ; and tarse nearly  $\frac{3}{4}$  in. Bill dusky above, below yellow or amber-coloured ; and tarse pale. Plumage, above dull olive-green, brighter on the rump and margins of the wing and tail-feathers, those of the primaries yellowish, and a pale rufescent bar across the wing : two broad black streaks on the crown, and between them a dull greenish streak flanked with ashy : supercilia also dull green ; but the orbital feathers are yellow ; and the entire under-parts are pale dull yellow, or albescent-yellowish, becoming of a deeper yellow on the belly and lower tail-coverts : tail having its *three* outer feathers wholly white, save the terminal half of their outer web, together with the tip of the inner web of the ante-penultimate and slightly of the penultimate.

Inhabits the Nepal and Sikim Himalaya.\*

4. C. SCHISTICEPS ; *Abrornis schisticeps*, Hodgson, nobis, *J. A. S.* XIV, 592 : *Phyllopneuste xanthoschistos*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82 (undescribed) ; G. R. Gray, 'Appendix to Catalogue,' p. 151.

Length  $4\frac{1}{4}$  in. : of wing  $2\frac{1}{4}$  in., with primaries as in C. BURKII : tail  $1\frac{5}{8}$  in. : bill to gape  $\frac{5}{8}$  in. ; and tarse  $\frac{5}{8}$  in. Bill dusky above, below amber-coloured ; and feet apparently pale brownish-plumbeous. Plumage, above pale ashy, passing to greenish-yellow on the

\* Mr. G. R. Gray suggests that this may be the young of his ABR. EROCHROA, Hodgson, which he thus describes :

"Length 5 in. ; bill from gape  $\frac{1}{2}$  in. ; tarse  $\frac{3}{4}$  in. : wings under  $2\frac{1}{2}$  in. Upper surface olive-green ; a streak over each eye from the nostrils, under surface and lower part of back, yellowish-white, brightest on the back [rump?] and vent : wings with the tips of the greater coverts broadly margined with rufous-white : quills brownish-black, narrowly margined with yellowish-green : tail slaty-brown, margined with yellowish-green, the outer feathers principally white."

We suspect that this description merely refers to a fine specimen of C. PULCHRA ; and may remark that the present is the only species of the series of which the Society possesses but an indifferent specimen Of the rest, C. CASTANEOCEPS we have never seen ; but all of the others, save four, we here describe from *recent specimens* shot near Calcutta ! The four exceptions are—PHYLLOSCOPUS OCCIPITALIS, and PH. CHLORONOTUS, and the two CULICIPETÆ which next follow ; and to these may be added the REGULUS.

rump, wings and tail : below, with the cheeks and lower half of the ear-coverts, wholly bright yellow : a whitish-grey supercilium and narrow medial streak upon the crown, and two broad ill-defined lateral streaks of rather a more dusky grey than that of the back : outermost and penultimate tail-feathers only, white on their inner webs. The young have looser plumage and all the colours less intense.

This appears to be very common throughout the sub-Himalayan territories, and is likewise met with in Arakan ; but it appears never to descend from the hills. According to Capt. Hutton, it is a common species at 5000 ft. elevation, and commences building in March. The nest would appear to resemble those of *PHYLLOSCOPUS TROCHILUS* and *PH. RUFUS*. Eggs spotless white. Vide Hutton, in J. A. S. XVII, pt. II, p. 688.

5. *C. POLIOGENYS*, nobis, J. A. S. XVI, 441.

Length  $4\frac{1}{4}$  in. : of wing  $2\frac{1}{8}$  in., with the outermost primary  $\frac{5}{8}$  in. long, the second exceeding it by  $\frac{9}{16}$  in., and the third  $\frac{1}{8}$  in. shorter than the fourth, which equals the fifth and sixth : tail  $1\frac{5}{8}$  in. : bill to gape  $\frac{9}{16}$  in. ; and tarse  $\frac{5}{8}$  in. Bill dusky above, yellow or amber-coloured below. Legs pale. Plumage, above dark olive-green, slightly yellowish on rump, with a conspicuous narrow yellowish-white wing-band : crown and ear-coverts dusky-grey, with blackish coronal bands ; the chin, and feathers proceeding from the base of the lower mandible, greyish-white : rest of the lower-parts bright yellow : tail with its three outer feathers white on the inner web, as in *C. PULCHRA*.

We have only seen this well marked species from Sikim. It might be mistaken for the preceding on a very superficial view ; but besides the differences in the details of colouring, its wings are much more rounded and the bill is somewhat less compressed.

6. *C. CASTANEOCEPS* ; *Abrornis castaneiceps*, Hodgson, nobis, J. A. S. XIV, 593 ; *Abr. castaneocephs*, H., Gray, Zool. Misc. 1844, p. 82 ; G. R. Gray, 'Appendix to Catalogue,' p. 152.

"Length  $4\frac{1}{2}$  in. : wing nearly 2 in. : bill to gape above  $\frac{5}{8}$  in. : tarse  $\frac{5}{8}$  in. Upper surface olive-green : front and top of head, pale rufous-chesnut ; hind-head and nape greyish-slate. Lower part of back and abdomen bright yellow : throat white : wings and tail

brownish-black, margined with yellowish-green: greater coverts of the wings tipped with yellow, forming two bands.”—G. R. Gray.

“Above vernal green: belly, vent, and croup, deep yellow. Chin to belly white, passing laterally to soft plumbeous. Top of head chesnut, bounded by black to sides. Bill and legs pale. Length 4 in.: wing  $1\frac{1}{6}$  in.: tail  $1\frac{1}{2}$  in.: bill to forehead  $\frac{3}{8}$  in.: tarse  $\frac{3}{4}$  in.”—Hodgson.

Procured by Mr. Hodgson in Nepal. We have never seen a specimen.

Finally, may be noticed a Javanese species of this group.

7. C. TRIVIRGATA; *Sylvia trivirgata*, Temminck, Verreaux *M.S.*: *Phylloscopus trivirgatus*, Strickland, figured and described in Sir W. Jardine’s ‘Contributions to Ornithology,’ November, 1849.

“Length 4 in.; of wing 2 in. 2 l.; middle tail-feathers 1 in. 8 l.; outermost  $1\frac{1}{2}$  in.: bill to gape 5 l.; tarse 7 l.

“In plumage, it greatly resembles the broader-billed but closely allied C. BURKEI of India. Middle of crown olive-yellow, which occupies the inner webs of the feathers, the outer webs being deep fuscous, nearly black, with an olive tinge, forming a broad dark stripe on each side of the crown: between this and the eye is a superciliary streak of clear yellow: a streak of fuscous passes through the eye; the cheeks, throat, and lower-parts are bright yellow, with an olive tinge; back and wings yellowish-olive: beak horn-coloured, the base of lower mandible pale; and legs brown.

“Inhabits the island of Java.” Strickland.

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*A Passage in the life of Válmíki.*—By FITZ-EDWARD HALL, Esq. M. A.

It is a current belief, in many parts of India, that the poet Válmíki, the author of the Rámáyana, was a *thug* or strangler. This notion was probably derived from a strain put upon the following verses, which make out Válmíki to have been, originally, on his own confession, simply a robber. This extract also embraces the received account of the origin of the poet’s name.

राम त्वन्नाममहिमा वर्ण्यते केन वा कथम् ।  
 यत्प्रभावादहं राम ब्रह्मर्षित्वमवाप्तवान् ॥  
 अहं पुरा किरातेषु किरातैः सह वर्धितः ।  
 जन्ममात्रद्विजत्वं मे शूद्राचाररतः सदा ॥  
 शूद्रायां बहवः पुत्रा उत्पन्ना मेऽजितात्मनः ।  
 ततश्चौरैश्च सङ्गम्य चोराऽहमभवं पुरा ॥  
 धनुर्बाणधरो नित्यं जीवानामन्तकोपमः ।  
 एकदा मुनयः सप्त दृष्ट्वा महति कानने ॥  
 साक्षान्मया प्रकाशन्तो ज्वलनार्कसमप्रभाः ।  
 तानन्वधावं लोभेन तेषां सर्वपरिच्छेदान् ॥  
 ग्रहीतुकामस्तत्राहं तिष्ठ तिष्ठेति चाब्रुवम् ।  
 दृष्ट्वा मां मुनयोऽपृच्छन् किमायासि द्विजाधम ॥  
 अहं तानब्रुवं किञ्चिदादातुं मुनिसत्तमाः ।  
 पुत्रदारादयः सन्ति बहवो मे बुभुक्षिताः ॥  
 तेषां संरक्षणार्थाय चरामि गिरिकानने ।  
 ततो मामूचुरथ्यग्राः पृच्छ गत्वा कुटुम्बकम् ॥  
 यो यो मया प्रतिदिनं क्रियते पापसञ्चयः ।  
 यूयं तद्भागिनः किं वा नेति वेति पृथक् पृथक् ॥  
 वयं स्थास्यामहे यावदागमिष्यसि निश्चयम् ।  
 तथेत्युक्त्वा गृहं गत्वा मुनिभिर्यदुदीरितम् ॥  
 अपृच्छं पुत्रदारादींस्तैरुक्तोऽहं रघूत्तम ।  
 पापं तवैव तत् सर्वं वयं तु फलभागिनः ॥  
 तच्छ्रुत्वा जातनिर्वेदो विचार्य पुनरागमम् ।  
 मुनयो यत्र तिष्ठन्ति करुणापूर्णमानसाः ॥  
 मुनीनां दर्शनादेव शुद्धान्तःकरणोऽभवम् ।  
 धनुरादीन् परित्यज्य दण्डवत् पतितोऽस्म्यहम् ॥



रक्षध्वं मां मुनिश्रेष्ठा गच्छन्तं निरयाणवम् ।  
 इत्यग्रे पतितं दृष्ट्वा मामूचुर्मुनिसत्तमाः ॥  
 उत्तिष्ठोत्तिष्ठ भद्रं ते सफलः सत्समागमः ।  
 उपदेक्ष्यामहे तुभ्यं किञ्चित् तेनैव मोक्ष्यसे ॥  
 परस्परं समालोच्य दुर्दत्तोऽयं द्विजाधमः ।  
 उपेक्ष्य एव सदृत्तैस्तथापि शरणं गतः ॥  
 रक्षणीयः प्रयत्नेन मोक्षमार्गापदेशतः ।  
 इत्युक्त्वा राम ते नाम व्यत्यस्ताक्षरपूर्वकम् ॥  
 एकाग्रमनसात्रैव मरेति जप सर्वदा ।  
 आगच्छामः पुनर्यावत् तावदुक्तं सदा जप ॥  
 इत्युक्त्वा प्रययुः सर्वे मुनयो दिव्यदर्शनाः ।  
 अहं यथोपदिष्टं तैस्तथाकरवमञ्जसा ॥  
 जपन्नेकाग्रमनसा बाह्यं विस्मृतवानहम् ॥  
 एवं बद्धतिथे काले गते निश्चलरूपिणः ॥  
 सर्वसङ्गविहीनस्य वल्मीकोऽभून्ममोपरि ।  
 ततो युगसहस्रान्ते ऋषयः पुनरागमन् ॥  
 मामूचुर्निष्कमस्वेति तच्छ्रुत्वा तूर्णमुत्थितः ।  
 वल्मीकान्निर्गतश्चाहं नीहारादिव भास्करः ॥  
 मामप्याज्जर्मुनिगणा वाल्मीकिस्त्वं मुनीश्वर ।  
 वल्मीकात् सम्भवो यस्माद्वितीयं जन्म तेऽभवत् ॥  
 इत्युक्त्वा ते ययुर्दिव्यगतिं रघुकुलोत्तम ।

*Translation of the above.*

By whom, or how, O Ráma, can the greatness of thy name be rehearsed,—that name by whose power I, O Ráma, have attained the rank of a Bráhmaṇ saint? In bygone times I was bred among Kirátas, with the children of Kirátas.\* But by birth only was I

\* “By Kirátas, foresters and mountaineers are intended, the inhabitants, to the present day, of the mountains east of Hindustan” Wilson’s *Vishṇu Purána*, p. 175, note 4.

a Bráhmaṇ; *for* I was perpetually devoted to the practices of S'údras. From S'údra women many children were born to me of unsubdued passions. And at last, having fallen in with robbers, I *myself*, of yore, became a brigand,—bearing constantly a bow and arrows, and resembling, to men, the god of death. In a great forest, on a certain occasion, I saw before me the seven Munis,\* resplendent, and glorious like fire and the sun. Through cupidity I pursued them, longing to seize their possessions; and I shouted “stop, stop.” Seeing me, the Munis asked, “Wherefore hast thou come, base Bráhmaṇ?” “To acquire something, O most excellent of Munis,” was my reply to them. “My children, my wife, and others,—many,—are starving. To save them I wander through the mountain forests.” Upon this, they, undismayed, said to me: “Go and ask your family, one by one, whether they *consent*, or not, to participate in *the guilt* of the numerous sins that are daily committed by thee. We will certainly remain *here* until you return.” Replying, ‘yes,’ I went home, and put the question propounded by the Munis, to my children, wife, and others. They replied to me, O noblest of the Rághavas, “All the sin is, *we deem*, thy own alone: we are *willing to be* sharers in the *immediate* fruit of it only.” Contrite at hearing this, I went back, thoughtful, to the place where the Munis, with hearts full of compassion, were waiting. At the very sight of them, my soul was purified. Flinging away my bow and other *weapons*, I fell prostrate, *crying*, “Save, O excellent Munis, me who am on the road to the sea of perdition.” Beholding me lying before them, the venerable Munis said to me: “Rise, rise: blessings *be* upon thee. Communion with the pious is effectual. We will instruct thee somewhat; *and* so thou shalt be saved.” Looking at each other, *they continued*: “This vile Bráhmaṇ, as being addicted to evil courses, deserves only to be shunned by the virtuous. Since, however, he has come for sanctuary, he must be diligently protected, by being taught the way of salvation.” So saying, O Ráma, *they enjoined that*, with fixed attention, *I should* unremittingly meditate, in that very place, upon thy name, its syllables being transposed, namely,

\* The name of *Muni* is applied to any divine sage. It is here used for *Rishi*, as appears from the sequel. For the various conflicting accounts of the seven *Rishi*, see Wilson's *Vishṇu Purāṇa*, p. 49, note 2.

*mará*.\* “Meditate,” said they, “as directed, till we come again.” Having thus spoken, the divinely wise Munis departed. At once I did as I had been bidden by them. With concentrated mind I meditated, and lost all consciousness of things external. Above me, rigid in figure, and detached from all commerce *with the world*, there arose, after a long lapse of time, thus *employed*, an ant-hill. Subsequently, at the close of thousands of cycles, the Rishis returned. “Come out,” said they to me; and immediately, on hearing this *command*, I stood up. And I emerged from the ant-hill, like the sun from the mist *of morning*.† The band of Munis then addressed me: “Great Muni, be thy name Válmíki; for thy egress from the white-ant hill (*Válmika*) has been to thee a second birth.” Thus speaking, O most eminent of the race of Raghu, they proceeded on the road to heaven.‡

This narrative is to be found at S'l. 64—86 of the sixth chapter of the second book, called *Ayodhyá-kánda*, of the *Adhyátma-rámáyana*. The *Adhyátma-rámáyana* is said, by Náges'a Bhaṭṭa, in his commentary on it, to be a portion of the *Brahmaṇḍa-purāṇa*. This annotator further states, in opposition to the general opinion, that the Válmíki here spoken of is not the author of the *Rámáyana*, but a descendant of Prachetas.

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### Literary Intelligence.

Mr. Hodgson still prosecutes at Darjiling the philological researches which had reached so interesting a point on his departure for England, towards the close of 1852. Pending the receipt of a full communication which may shortly be expected from him, the following extracts from his recent letters will show the result of his investigations; “results not only decisive,” says Mr. H., “of the widest assigned scope of Tartar affinities, but also of high moment in illustration of the science of language in general.

\* The Rishis considering him unworthy to repeat the name of Ráma in its ordinary form.

† During the Indian winter.

‡ This passage is alluded to by Prof. Wilson, in his *Hindu Theatre*, Vol. I. p. 313, foot-note: 2nd Ed.

Not only are all the Tartars from America to Oceania (both inclusive) demonstrated to form one family, with a clearness equal to that brought by our Bopps and Grimms to demonstrate the full scope of Indo-European affinities, but that great law of language expounded by Spinosa and Koerber in relation to Hebrew, and by Tooke in reference to English, is shown to have an universal character by its thorough and palpable bearing upon the Tartar tongues, wherein moreover it may be grasped and held fast, not as an induction but as a clear extant fact, owing to the so long retarded and yet very imperfect cultivation these tongues have obtained. And, again, the alleged grand distinction of monosyllabism and polysyllabism upon which the inunity of the Tartars has been so confidently rested, is shown to be valueless; the so-called monosyllabism being not really such, and the so called polysyllabism being mere repetition of the same or of synonymous syllables, roots and words: in other words it is syntheticism.

“So that America is linked to Tartary by the greatest and most essential characteristic of her languages. In order to reach such results, I have had to weigh every syllable and every letter of each word, and to trace each to a root, demonstrated to be such by its standing *alone* as a word. In the vast majority of words, I have obtained one or more samples of the pure monosyllabic form of the vocable, and I have thence proceeded to the polysyllables, still seeking for the radical monosyllable of every syllable of even the longest words. My media of investigation and of test have been: 1st, Comparison of the differing synonymies of a given tongue. 2nd, Comparison of the written and spoken forms of such tongues as have both. 3rd. Comparison of the ancient and modern words of given cultivated tongues, where available, as happily is the case, for me, in regard to the Deccani languages. 4th. Comparison of the dialects of a confessedly single tongue, rich in such varieties, as the Naga and Garo for instance. 5th, Comparison of the languages of the old broken and of the recent dominant tribes. 6th, Comparison of given words standing apart and of those words as they occur in composition—a medium of proof which, by the way, alone suffices to show the emptiness of the monosyllabic dogma. Happily for the furtherance of my researches, I obtained, after my return from Europe,



a fresh series of Himalayan tongues, and one of very great value as serving to add several links to the chain of affinities that else had been wanting. These new tongues are those of the broken tribes of Himalaya of which the Chepang, already published, is one. Our broken tribes are precisely analogous to those of China, Indo-China, Malaya, Polynesia and Tamulia; and the state of the languages every where reveals the same fact, that successive waves of one and (essentially) the same human tide swept over the South from the North, some reaching our India direct from Tibet, others indirect from Indo-China.'

"With reference to Indian philology only, the following are the results of my researches. 1st, That all the cultivated Tamulian tongues (in Ceylon as well as Deccan) are essentially one. 2nd, That the whole of the uncultivated Tamulian tongues (Kol, Gondi, Maler, Lerka, &c.) are essentially one. 3rd, That the above two classes are essentially but one and the same class. 4th, That that class is the Tartarie, to use its largest and general designation. 5th, That a vast number of the most indispensable vocables of the so-called Arian vernaculars of India (Hindi, Urdu, Asamese, Bengali, Uria, Mah-ratti, &c.) are thoroughly Tartar. 6th, That a very considerable number of Sanskrit vocables of the most indispensable use, are Tartar, and that not merely in their ordinary or composite, but also in their radical forms.

"So far from seeking I have rather avoided such words as belong to 5 and 6, lest I should retard the reception of my more immediate and more general results; but I have found it impossible to leave those words out of view altogether, and, though I do not anticipate ever becoming an advocate of the doctrine of Dr. Latham and Mr. Crawford, yet am I already much struck with the fact that very numerous words in my vocabularies, against which when they were compiled I wrote H. U. or S. to denote a Hindi, Urdu or Sanskrit origin, turn out upon closer investigation to be thoroughly Tartar, even when analysed and resolved into their roots, as well as when taken statu quo of speech and book."

In Jameson's Journal for April will be found a paper by Dr. Buist, on the Physical Geography of Hindustan.

Lieut Eastwick has brought out a 2nd edition of the two first vols.

of his translation of Bopp's Comparative Grammar, but the book is still disfigured by many inaccuracies, which are noticed with some severity in the Westminster Review for July.

In the Journal Asiatique No. 2 (March and April) is the first part of a Sanskrit work, text and translation, called Bhoja-Prabandha, or the history of Bhoj of Malwa, not the Bhoj of the Mahábhárat, but Bhoj son of Sindhoula, who reigned about the middle of the 10th century, A. D. and whose capital was at Dhar or Dhara on the Nerbudda. Sindhoula is not mentioned in the list which Pere Tieffenthaler has given of the Malwa kings, but he, Prof. Wilson and Wilford, who had closely studied the Bhoja-Prabandha; all place Bhoj between 913 and 967.

The MS., of the completeness of which the Editor M. Pavie has doubts, is one of those taken from Bombay by M. d'Ochoa. The 1st part contains historical matter, the 2nd which is to appear in a future No. and which is much fuller, is in.

The next article is an extract from an Arabic work by Aly Ossai-biah called the History of Physicians, which is translated by M. Sanguinetti. The author was a native of Damascus and lived in the 13th century. M. deMeynard's continuation of his Tableau Littéraire for Transoxiana and Khorasan complete the No.

The war in Turkey can scarcely fail to leave as one of its consequences an extended taste in Europe for the study of oriental languages and literature. Alexander Chodzko, known by his grammar of the modern Persian language and other works, has published a Manual for the use of the French army under the title of 'Le Dragoman Ture', and in our own country Max Müller of Oxford has responded to the invitation of Sir Chas. Trevelyan by drawing up an elaborate essay on the 'Languages of the Seat of War in the East,' of which two copies have been sent for our library. The latter, though hurriedly written, will prove of more than temporary service; it brings together and into a small compass much valuable philological information beyond the reach of the generality of students.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1854.

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At a meeting of the Society held on the 2nd inst. at the usual hour,

SIR JAMES COLVILE, Kt. President, in the Chair,

The minutes of the last month's proceedings were read and confirmed, and the accounts and vouchers for the months of March, April and May laid on the table.

Presentations were received—

1. From Capt. Thuillier, Deputy Surveyor General, a Map of the Twenty-four Pergunnahs.

2. From the Curators of the Academy of Leyden, '*Libri Exodi et Levitici secundum Arabicam Pentateuchi Samaritani Versionem*.'

3. From Maulavi Mohammad Alum Ali Khan, an Arabic MS. of the *Kámús*, in 2 Vols.

4. From Capt. Sherwill, through Capt. Thuillier, a collection of ancient Hindu copper and silver coins.

The following is an extract from Capt. Sherwill's note on these coins:

"As far as I can ascertain, they are coins of the Cheeroo Rajahs who, in olden days, ruled over Behar and that before the Moham-medan conquest. The coins were dug up at Futooha, or near to it, that is, about ten miles to the east of the city of Patna. They were twelve feet below the level of the country, and in their neighbourhood was found a flooring of very large flat bricks about two feet square."

Lt.-Col. Proby T. Cautley of the Bengal Artillery, F. R. S., F. G. S. was, pursuant to notice given at the last meeting by the Council, balloted for, and duly elected an honorary member.

Mr. W. Grapel was balloted for, and elected an ordinary member.

R. Spankie, Esq. C. S. was named for ballot at the next meeting : proposed by G. H. Freeling, Esq. and seconded by Dr. Clarke.

The Council submitted a report recommending that the offer of M. Alexander Von Kremer, Dragoman of the Austrian Consulate at Alexandria, to edit the original text of Waquidy on the Wars of Mohammad for publication in the Bibliotheca Indica, be thankfully accepted.

Ordered that the recommendation be adopted.

Communications were received—

1. From E. Thomas, Esq., a paper entitled ‘ Notes on the present state of the Excavations at Sarnáth.’

2. From the Assistant Secretary to the Government of the North Western Provinces, forwarding copy of a Meteorological Register kept at the Office of the Secretary to the Government N. W. P. for the month of June, 1854.

3. From Dr. Fayrer, Lucnow, enclosing a copy of Meteorological Observations kept at the Lucnow Residency, for the month of May, 1854.

4. From Bábu Rádhánáth Sikdár, enclosing abstracts of Meteorological Observations taken at the Surveyor General’s Office, during the month of April last.

The Librarian submitted his usual monthly report.

The Curator of the Zoological Museum exhibited a small collection of Insects which he had received from Ceylon, and a very large Fungus (*Boletus* ?) which had been brought down from Upper Assam.

#### LIBRARY.

The library has received the following accession of books since the last meeting.

#### *Presented.*

The Kámús, an Arabic Dictionary in two volumes MS.—BY MOULAVI MOHAMMAD ALAM ALI KHAN.

Libri Exodi et Levitici secundum Arabicam Pentateuchi Samaritani versionem ab Abu Saido conscriptum quos ex tribus codicibus edidit A. Kuenen. Lugduni Bat. 1854, 8vo.—BY THE CURATORS OF THE ACADEMY OF LEYDEN.



Natuurkundig Tijdschrift voor Nederlandsch Indië, Deel VI. aflevering III. a IV.—BY THE NATURAL HISTORY SOCIETY OF BATAVIA.  
 Journal Asiatique, for January, 1854.—BY THE SOCIÉTÉ ASIATIQUE.  
 The Oriental Christian Spectator, for July, 1854.—BY THE EDITOR.  
 Journal of the Indian Archipelago, for January and February, 1854.—BY THE EDITOR.

Calcutta Christian Observer, for August, 1854.—BY THE EDITORS.  
 The Oriental Baptist, No. 92.—BY THE EDITOR.  
 The Upadeshak, No. 92.—BY THE EDITOR.  
 The Proceedings of the Royal Society of London, for April and May 1854.—BY THE SOCIETY.  
 The Bibidhārtha Saṅgraha, No. 28.—BY THE EDITOR.  
 The Annual Report of the Tattwabodhiní Sabhā, for the Bengali year 1776.—BY THE SABHĀ'.

*Exchanged.*

The Athenæum for April, 1854.  
 The London, Edinburgh and Dublin Philosophical Magazine for May, 1854.  
 The Calcutta Review, for June, 1854.

*Purchased.*

Comptes Rendus, Nos. 14 to 17.  
 The Annals and Magazine of Natural History for May, 1854.  
 Rāghava Pāndaviya, an Epic Poem by Kavirāja Pandita with a commentary styled Kapāta-vipātika. By Premchānd Tarkavāgīsa, 5 copies.

RA'JENDRALĀ'L MITTRA.

*August 2nd, 1854.*

# JOURNAL

OF THE

## ASIATIC SOCIETY.

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No. VI.—1854.

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*A Twenty-third Memoir on the Law of Storms in the Indian and China Seas ; being the Peninsular and Oriental Steam Navigation Company's Ship PRECURSOR's Cyclone, of October, 1851.—By HENRY PIDDINGTON, President of Marine Courts.*

This Memoir furnishes us not only with a new track for the Cyclones at the Sand Heads, but, at length, an instance of the rare, though not unexpected case of the undoubted curving of a Cyclone track to the North-East in the Bay of Bengal, analogous to those which are so commonly seen in the Western hemisphere! and which we have recently shewn to occur in the China Sea.

I commence the documents with the Logs of the ships farthest to the Southward, so as to trace the Cyclone inwards from sea. The documents are followed by a tabular arrangement of them and a summary, detailing the data on which this remarkable track is laid down, and this by remarks on the various accessory phenomena and results of the investigation.

*Abridged Log of the Barque ARARAT, Capt. RITCHIE, from Mauritius to Calcutta—reduced to Civil Time.*

18th October, 1852.—The *Ararat* was at Noon in Lat.  $11^{\circ} 35'$  North ; Long.  $87^{\circ} 12'$  East, with her Barometer at 29.82 ; Ther.  $87^{\circ}$ . Steering to the north with a six knot breeze at W. S. W. ; P. M. a little squally.

19th Oct.—A. M. more settled ; but at daylight dark cloudy weather with sharp squalls, continuing to Noon when Lat.  $13^{\circ} 50'$  N. ; Long.  $29^{\circ} 51'$  E. ; Ther.  $84^{\circ}$  ; Bar. not marked ; Wind from W. S. W. to W. b. N. P. M. wind

marked S. S. W, strong breeze and threatening weather, which increased to midnight, when wind is marked at S. b. W.; continued squalls and heavy rain.

20th Oct.—The same, but moderating a little at daylight. 10.30 A. M. violent squalls from S. W. and S. b. W. At Noon a heavy sea coming up from the N. Westward with a very heavy appearance, Lat. Acct.  $16^{\circ} 28' N.$ ; Long. Acct.  $86^{\circ} 58' E.$ ; Bar. 29.75; Ther.  $84^{\circ}$ . 1 30 P. M. rounded to; wind S. S. W. increasing gale and more squalls. Barometer gradually falling. 2 P. M. Bar. 29.67. Midnight hard gale and torrents of rain.

21st Oct.—4 A. M. bore up. Noon more moderate. Lat. Obs.  $17^{\circ} 6' N.$ ; Long.  $87^{\circ} 50' East$ ; Bar. 29.70; Ther.  $84^{\circ}$ . Wind South at 5 A. M. and S. S. W. at noon; P. M. S. S. W. to midnight. Moderate gale, ship running 7 and 8 knots to the N. b. W. but by sunset hard squalls from the southward. Midnight, hard gale and squalls; 10 knot breeze; wind about South.

22nd Oct.—3 A. M. wind South; 4 A. M. close reefed. Daylight hove to again and made all preparations for a hard blow. 10, gale increasing and squalls more severe from the south, "*A dense black bank hanging to the westward.*"\* Bar. 29.62. "At 11, a hard *dry* gale" with a heavy sea; Noon hard gale. Lat. Obs.  $19^{\circ} 10' N.$ ; Long. Chr.  $88^{\circ} 2' E.$ ; Bar. 29.66; Ther.  $87^{\circ}$ . P. M. wind S. W. b. S.† hard gales lying to. The same to midnight.

23rd Oct.—9 A. M. wind marked S. S. W. hard gale. Lat. by Indff. Obs.  $19^{\circ} 30' N.$ ; Long. Acct.  $88^{\circ} 04'$ , Bar. 29.68; Ther.  $86^{\circ}$ . At 3 P. M. wind S. W. b. W.; 6 P. M. W. S. W. moderating and wind hauling to the westward.

24th Oct.—3 A. M. wind W. N. W.; 6 A. M. N. W.; at 2, in 47 fathoms mud. Daylight fine; Noon Lat.  $20^{\circ} 32'$  north; Long.  $88^{\circ} 10'$  east; Bar. 29.74; Ther.  $86^{\circ}$ .

*Abridged Log of the Barque EASURAIN, Captain CLOUGHTON, from Penang to Calcutta—reduced to Civil Time.*

The *Easurain* was at Noon on the 20th Oct. 1851 in Lat.  $15^{\circ} 25' N.$ ; Long. Chr.  $91^{\circ} 56' E.$  P. M. moderate breezes (7 knots S. East and fine.) Bar. corrected to that of the Surveyor General's Office, 29.95. A heavy S. W. swell.‡ Midnight the same and ship rolling very heavily.

21st Oct.—Moderate 7 and 8 knot breeze, South to S. S. W. to Noon with a very heavy S. W. swell. Wind S. E., ship endangering her masts by rolling

\* Italics are mine, this bank was the body of the Cyclone.

† See remarks.

Chart  
TO THE  
**TWENTY THIRD MEMOIR**  
(ON THE LAW OF STORMS  
being  
THE PEN-&OR: COMP<sup>ST</sup> STEAMER  
PRECURSOR'S CYCLONE  
21<sup>st</sup> to 23<sup>rd</sup> Oct.  
1851)  
By  
*Henry Piddington.*







so much. Noon the same swell. Lat. Obs.  $17^{\circ} 4' N.$ ; Long. Chr.  $90^{\circ} 33' E.$ ; Bar. 29.93; Ther.  $86^{\circ}$ ; Current S.  $\frac{1}{2}$  W. 20' in the 24h. P. M. wind South ship running 6 and 7 knots to the N. b. W. with a heavy cross sea from W. N. W. to S. W. rolling gunwales under and masts in constant danger;\* at 5 Bar. 29.95; at 6, 29.88; at 8, 29.90; midnight 29.88. Strong gales South; cloudy, and very heavy turbulent sea.

22nd Oct.—A. M. strong gales South and cloudy, turbulent cross sea. 4 A. M. Bar. 29.89; 6 A. M. Bar. 29.88. Fresh gales and passing squalls with a dark threatening appearance to W. S. W. 8 A. M. Bar. 29.90. Close reefing. Noon strong gales and a tremendous cross sea. Lat. Obs.  $19^{\circ} 39' N.$ ; Long. Chr.  $89^{\circ} 55' E.$  Bar. 29.88; Ther.  $86^{\circ}$ ; Current S. E. b. E. 16 miles. P. M. ship steering 7 knots to the N. b. W.  $\frac{1}{2}$  West strong gales S. S. W. course N. W.  $\frac{3}{4}$  W. 7 knots to 4 P. M. when hove to. Bar. 2 P. M. 29.88; 4, 29.88; at 6, 29.84; at 8, 29.87; midnight 29.85. Hard gales and tremendous sea from S. W. to west.

23rd Oct.—A. M. Bar. 29.82; 4 A. M. 29.84. Daylight hard gale S. to S. S. W. and high sea Bar. 29.88. Noon the same and sea as before S. W. to west; Lat. Obs.  $20^{\circ} 11' N.$ ; Long. Chr.  $89^{\circ} 41' E.$ ; Bar. 29.85; Ther.  $84^{\circ}$ . P. M. wind S. S. W. to S. W. Lying to as before, sea the same; 2 P. M. Bar. 29.80; at 3, 29.76 dark gloomy appearances to West and increasing sea; at 6, Bar. 29.76. *A strange phenomenon appeared all at once. The sky from west, northerly, to north easterly, assumed a lurid hue like fire and continued to appear so for about three quarters of an hour.*† At 8, Bar. 29.78. tremendous sea continuing; midnight Bar. 29.84.

24th Oct.—4 A. M. Bar. 29.00; moderating; 5 A. M. wind S. W. to West sea going down fast; Noon Lat. Obs.  $19^{\circ} 54'$ ; Long. Chr.  $90^{\circ} 24'$ ; Bar. 29.10; Ther.  $65^{\circ}$ , fresh breeze and cloudy.

*Abridged Log (from a tabular Extract) of the Ship LORD PETRE,  
Capt. MIDDLETON, from the Mauritius bound to Calcutta.*

21st Oct.—At Noon in  $19^{\circ} 20'$  North Lat.; Long.  $89^{\circ} 54'$  East. Wind S. W. to S. b. E. South and S. b. E. light vessel bearing N. W. 120 miles. Bar A. M. 29.86; P. M. 29.90 and 29.86; Ther.  $78^{\circ}$  and  $77^{\circ}$ ; A. M. squally;

\* These seas were the rearward sea of the Cyclone and the regular Monsoon sea.

† I have put this in Italics, but the hour of the day and its appearance between west and north leave no doubt it was an effect of the sunset; but from the bearing of the Cyclone disk, it was also the sunlight seen *through* it, and we have thus perhaps in part, here one explanation of the phenomenon of the red sky as an effect of refracted light; though not for the long periods during which it has been observed.

4 P. M. hove to. Dark squally weather. Midnight strong gale, under close-reefed main topsail, &c.

22nd Oct.—Wind S. b. E. Bars. 29.78 and 29.80; P. M. 29.70 and 29.70; Ther. 78°; Noon Lat. 20° 02' N.; Long. 89° 20' E. A. M. strong gales to 8; at Noon moderate and cloudy, but P. M. strong gales and squalls with severe lightning. Hove to as before.

23rd Oct.—Wind S. b. W. and S. S. W., S. W. b. W. and W. S. W. Bar. 29.70 and 74 to 78. At 9 A. M. Light Vessel station calculated to bear N. W. 50 miles; Noon Lat. 20° 29' N.; Long. 89° 14' E.; 6 A. M. hurricane till 9 A. M.; at Noon fresh gale; midnight dark squally appearance to the S. W. with much lightning.

24th Oct.—Wind West to W. b. N. Bar. 29.82 and .85 to .87 and .90: Noon Lat. 19° 51' N.; Long. 89° 51' East. From 2 to 8 A. M. much lightning and heavy rain. Noon fine weather.

### *Ship FAZEEL CURRIM.*

The *Fazeel Currim*, on the 21st October, when in about Lat. 19° 30' N.: Long. 89° 40' E. experienced a severe gale which lasted about 60 hours with occasional lulls; sent down top gallant yards and masts and housed mizen topmast; bore up for Sand Heads 24th October, at 7 A. M.

### *Abridged Log of the Ship GEORGIANA, Capt. WILLIAMS, from Liverpool to Calcutta, arranged to Civil Time.*

| <i>Date.</i>           | <i>Bar.<br/>No. 1.</i> | <i>Bar.<br/>No. 2.</i> | <i>Symp.</i>   | <i>Ther.</i> | <i>Wind.</i> | <i>Remarks.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|------------------------|------------------------|----------------|--------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oct.<br>19th,<br>1851. | 29.90                  | 29.97                  | 29.45          | 89           | E. S. E.     | P. M. moderate breeze and cloudy with smooth water; stood in and anchored at 2.30 P. M. in 9½ fms. veered out to 50 fms. on best bower; current running strong to the W. S. W. storm glasses very much agitated, my Bar. No. 1, has a very large tube and I have never before in the worst of weather witnessed such a pumping motion, it pumps up and down as much as a full tenth of an inch and the water is smooth, very suspicious. Sent down royal and top gallant yards, Mid: part light airs and calms with occasional flashes of lightning to the East and misty rain. |
|                        | 29.93                  | 29.93                  | 29.43          | 89           | East.        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                        |                        |                        |                |              | E. N. E.     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 20th<br>Oct.           | 29.92<br>30.01         | 29.92<br>30.01         | 29.43<br>29.55 | ..<br>88     | ....<br>.... | 8 A. M. looks threatening to the S. E. breeze freshening got under weigh and stood to the S. E. to 25 fms. and in to 10.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| <i>Date.</i>           | <i>Bar.<br/>No. 1.</i> | <i>Bar.<br/>No. 2.</i> | <i>Symp.</i> | <i>Ther.</i> | <i>Wind.</i> | <i>Remarks.</i>                                                                                                                                                                                                                                                                                                  |
|------------------------|------------------------|------------------------|--------------|--------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oct.<br>20th,<br>1851. | 29.91                  | 29.90                  | 29.35        | 89           | E. S. E.     | Noon moderate and has a soft wet appearance, no observations, very little current. Lat. Acct. 21° 4' Long. 88° 40'.                                                                                                                                                                                              |
|                        | 29.86                  | 29.86                  | 29.45        | 87           | E. S. E.     | P. M. Damp cloudy weather with light squalls. 4 P. M. finding the current again setting strong to the W. S. W. anchored in 10 fms., mud and sand with black shining specks; sent down top gallant masts.                                                                                                         |
|                        | 29.88                  | 29.89                  | 29.40        | 88           | ....         | Mid. part light airs; a bank to the S. E. with lightning in that quarter and a swell from the Eastward and south.                                                                                                                                                                                                |
| 21st<br>Oct.           | 29.84                  | 29.84                  | 29.35        | ..           | E. S. E.     | 4 A. M. ditto weather Bar. very unsteady. Daylight, prepared for sea; breeze increasing and sea getting up.                                                                                                                                                                                                      |
|                        | 29.83                  | 29.72                  | 29.34        | ..           | S. E.        | 10 A. M. looks suspicious to the E. S. E. and South, got under weigh with all possible speed and stood to the S. W. current setting to the north; noon wind and sea increasing. Weather very clear over head with a dark gloomy appearance to the eastward round to south. Lat. Obs. 21° 00' N. Long. 88° 30' E. |
|                        | 29.77                  | 29.76                  | 29.30        | 89           | S. E. b. S.  | P. M. increasing breeze squally; sea getting up rapidly; 3 P. M. 12 fms. water.                                                                                                                                                                                                                                  |
|                        | 29.68                  | 29.67                  | 29.20        | 88           | S. E. b. S.  | 4 Weather looks wild, heavy head sea S. W. carrying all possible sail to get an offing.                                                                                                                                                                                                                          |
|                        |                        |                        |              |              |              | 6 P. M. ditto increasing; double reefed; close reefed mizen and too reefed main sail; a sea burst the jib and it blew to ribbons.                                                                                                                                                                                |
|                        | 29.60                  | 29.60                  | 29.18        | 88           | S. E. b. S.  | 8 Tremendous head sea, heavy squalls with lightning, close reefed.                                                                                                                                                                                                                                               |
|                        | 29.57                  | 29.52                  | 29.15        | ..           | ....         | Midnight, tremendous squalls, incessant lightning, heavy cross sea S. E. and S. W. ship very labour-some; split main sail and it blew to pieces; fore-castle full of water brought crew aft to live; sounded in 35 fms. stiff bottom.                                                                            |
| 22nd<br>Oct.           | 29.53                  | 29.52                  | 29.10        | 87           | S. S. E.     | 4 A. M. gale very severe 4.30 A. M. Foresail and foretopsail blew out of the bolt rope bent another foresail by the reef and set it; got another topsail on the fore-castle but was obliged to lash it to the Capstan, not possible to get it aloft; seas running over all.                                      |



| <i>Date</i>            | <i>Bar.<br/>No. 1.</i> | <i>Bar.<br/>No. 2.</i> | <i>Symp.</i> | <i>Ther.</i> | <i>Wind.</i>  | <i>Remarks.</i>                                                                                                                                                                                                                                                                                                      |
|------------------------|------------------------|------------------------|--------------|--------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oct.<br>22nd,<br>1851. |                        |                        |              |              |               | 6.15 A. M. Wind veering more to the South wore ship to N. E. in 25 fms. mud. Extreme of Palmyras reef S. W. b. W. 15 miles.                                                                                                                                                                                          |
|                        | 29.48                  | 29.47                  | 29.04        | 86           | S.W.b.S.      | 10 A. M. a Tremendous squall of wind and rain, ship almost on her broad-side, but there was nothing for it, but hold on every thing, Burst the forestorm stay sail, mizen stay sail blew away, wind veered to S. W. ship heading up E. S. E. took the current on the lee beam and at noon, ship is in 35 fms. water. |
|                        |                        |                        |              |              | S.W.b.S.      | P. M. a hard gale and violent squalls ship under reefed foresail and storm main stay sail and making much better weather; checked the yards and kept ship E. S. E. bent the F. topsail close reefed and handed it                                                                                                    |
|                        | 29.53                  | 29.52                  | 29.06        | 84           |               | 4 P. M. ditto; glasses on the rise.                                                                                                                                                                                                                                                                                  |
|                        | 29.63                  | 29.62                  | 29.15        | 84           | S. W.         | Midnight violent squalls, tremendous cross sea, larboard bulwarks washing away.                                                                                                                                                                                                                                      |
| 23rd<br>Oct.           | 29.68                  | 29.68                  | 29.20        | 82           | ....          | 4 A. M. 45 fms. the gale appears broke.                                                                                                                                                                                                                                                                              |
|                        | 29.69                  | 29.69                  | 29.25        | ..           | ....<br>S. W. | 8 A. M. ditto weather.                                                                                                                                                                                                                                                                                               |
|                        |                        |                        |              |              |               | Noon more moderate but the weather has a very dirty appearance, looks very wild, sounded 45 fms.                                                                                                                                                                                                                     |
|                        | 29.70                  | 29.70                  | 29.25        | ..           | W. S. W.      | I allow the ship to be about 25 miles south of the Floating Light.                                                                                                                                                                                                                                                   |
|                        |                        |                        |              |              |               | P. M. strong gale and squally, set the top sails close reefed.                                                                                                                                                                                                                                                       |
|                        | 29.78                  | 29.77                  | 29.30        | ..           | ....          | 8 P. M. weather breaking up; lightning to the westward.                                                                                                                                                                                                                                                              |
|                        |                        |                        |              |              |               | Midnight squalls with heavy rain thunder and lightning to the eastward; sea going down fast.                                                                                                                                                                                                                         |
| 24th<br>Oct.           | 29.81                  | 29.80                  | 29.35        | 88           | West.         | A. M. moderate and fine.<br>Noon ditto Lat. Obs. 20.34 N. Long. 89.10 E.                                                                                                                                                                                                                                             |

By a comparison obtained here with the standard, for Capt. Williams's Bars. No. 1 required a correction of  $+ 0.130$ , and No. 2, of  $+ 0.07$ , to reduce the indications to ours here, and these corrections have been made by me, H. P.

*Letter and Barometrical Tables from Mr. W. BARCKLEY,  
Superintendent of FALSE POINT Light House.*

I beg to forward you statements, and memoranda of the Cyclone, that visited *False Point*, and its vicinity.

1st. In the forenoon of the 21st inst. I saw heavy clouds rising to the Northward and Eastward, occasionally with heavy rain. At noon the wind N. N. E. with heavy squalls and rain at intervals; at 4 P. M. I took great notice of the scuds from the Northward and Westward, and a lower scud from the S. E. crossing each other with a haze, and a red tinge. Round the horizon, was a circle of haze, and the breeze continued to freshen, till it increased to a strong gale, and veered from N. N. E. to S. E. with heavy passing showers, till 3 in the morning of the 22nd, with a falling Barometer all the time; but at times with a clear sky over head, and a thick haze round the horizon. At 5.15 A. M. of the 22nd inst. the Cyclone was at its highest, and at 7.30 A. M. it lulled to a stark calm, and then it set in a heavy mist all round, but very black to the southward. The calm lasted from 7.30 A. M. to 8.30 A. M. and then began to blow hard till it increased to blow as heavy as it did to the S. E.\* and veered from South to West till 3 P. M. when the Cyclone broke to nearly a calm with a rising Barometer.

2nd. I also make this remark on the storm wave; that the sea we could hear from 10 to 15 minutes, before the first roller reached the Light House, and it came in with three regular steady rollers, and then it was done, and left the whole place in an inundated state, carrying every thing before it; leaving us without a drop of fresh water about the place. It was really frightful to hear it. If I had been a landsman, I should thought it was an earthquake; it has swept one-third of Dodwell's Island away, the height of it† was 23 feet, but this storm wave extended to a place called Tuldundah, 24 miles from the mouth of the Mahanuddee river; this information I received from my men whom I sent out in different directions, from W. N. W. to S. S. W. distance about 30 miles each way from the Light House. At Tuldundah, even the embankment was washed away. The names of the places that suffered greatly are Tikree, Kodakon, Rogonatpore, Nowgong, Boliparra, Danton, Damapore,

\* So in MSS.

† The rise—W. B.

and Paradeep ; all these villages are nearly washed away, and about 1,430 head of cattle, have been accounted for as lost, and 120 men : my men passed a great number of bodies, floating in the Mahanuddee river.

3rd. I have suffered greatly at the Point, 13 panes of glass in the lantern, lightning-conductor, lamps, and reflectors gone ; all the men's and other out-houses swept away, and my assistant and his family completely washed out of their house. The whole of my boats completely destroyed with the exception of my little jolly boat, and she was stove in. This is the most severe Cyclone I have experienced for the 31 years I have been at sea, yet I find they felt very little of it at Cuttack, which is 60 miles from here, in fact I have nearly lost my all. On Sunday the 26th inst. I boarded the *Margaret S. Kelly*, in distress, with her ensign union down, going off through the heavy surf in my little jolly boat, about 10 miles off, and the Captain stated that he had seen the Black Pagoda, the night before the Cyclone came on ; I questioned him about his Barometer, but he could not give me any information, for he had not a light on board his vessel all night, but he mentioned to me, *that such awful thunder and lightning he never experienced, but we had none at the Point* : he could not even tell me, how the winds varied.

I herewith enclose a register of the winds and Barometer, with remarks at False Point.

*A Register of Winds and Barometer with Remarks.*

21st October, 1851.

| Hours.  | Baromt. | Winds.   | Remarks.                                                                                                                                   |
|---------|---------|----------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Noon.   | 29 „ 85 | N. E.    | Strong breezes from the North and East with heavy squalls, and showers of rain, with every appearance of a strong gale ; sky very clouded. |
| 1 P. M. | 29 „ 80 | „        |                                                                                                                                            |
| 2 „     | 29 „ 70 | „        |                                                                                                                                            |
| 3 „     | 29 „ 70 | „        |                                                                                                                                            |
| 4 „     | 29 „ 60 | N. N. E. | At 4 P. M. Scuds from the North and East and a lower scud from the S. E. crossing. Clouded horizon and clear over head with light rain.    |
| 5 „     | 29 „ 55 | N. E.    |                                                                                                                                            |
| 7 „     | 29 „ 51 | „        |                                                                                                                                            |
| 8 „     | 29 „ 50 | „        |                                                                                                                                            |
| 9 „     | 29 „ 52 | „        |                                                                                                                                            |
| 10 „    | 29 „ 60 | East.    |                                                                                                                                            |
| 12 „    | 29 „ 50 | N. E.    |                                                                                                                                            |

22nd October, 1851.

|         |         |          |                                                                                                                                                                                         |
|---------|---------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 A. M. | 29 „ 45 | E. N. E. | 2 30 A. M. The Sea made a complete breach up to the Light House like the rush of the bore; and carried away all the boats, boat-houses, anchors and chains, and gates of the inclosure. |
| 4 „     | 29 „ 22 | East.    |                                                                                                                                                                                         |
| 4 „ 15  | 28 „ 60 | „        |                                                                                                                                                                                         |
| 5 „ 15  | 28 „ 5  | S. E.    |                                                                                                                                                                                         |
| 6 „     | 28 „ 30 | „        |                                                                                                                                                                                         |
| 7 „     | 28 „ 10 | „        | 7 30 A. M. Stark calms with heavy rain.                                                                                                                                                 |
| 9 „     | 28 „ 5  | Calm.    | 9 30 A. M. Blew a complete hurricane with the wind at South, with rain.                                                                                                                 |
| 10 „    | 28 „ 21 | South.   |                                                                                                                                                                                         |
| 10 „ 30 | 28 „ 30 | „        |                                                                                                                                                                                         |
| 11 „    | 28 „ 51 | „        |                                                                                                                                                                                         |
| 11 „ 30 | 28 „ 70 | „        |                                                                                                                                                                                         |
| Noon.   | 29 „ 0  | S. W.    |                                                                                                                                                                                         |
| 1 P. M. | 29 „ 30 | S. W.    |                                                                                                                                                                                         |
| 9 „     | 29 „ 45 | „        |                                                                                                                                                                                         |
| 2 „ 15  | 29 „ 38 | „        |                                                                                                                                                                                         |
| 3 „     | 29 „ 50 | West.    | At 3 P. M. Gale broke with the wind at West.                                                                                                                                            |
| 4 „     | 29 „ 50 | „        | At 4 P. M. The water subsided.                                                                                                                                                          |
| 4 „ 30  | 29 „ 54 | „        |                                                                                                                                                                                         |
| 5 „ 30  | 29 „ 60 | „        |                                                                                                                                                                                         |
| 7 „     | 29 „ 60 | „        |                                                                                                                                                                                         |
| 8 „     | 29 „ 60 | „        |                                                                                                                                                                                         |
| 9 „     | 29 „ 65 | „        |                                                                                                                                                                                         |
| 10 „    | 29 „ 65 | „        |                                                                                                                                                                                         |
| 11 „    | 29 „ 70 | „        |                                                                                                                                                                                         |
| 12 „    | 29 „ 70 | „        |                                                                                                                                                                                         |

23rd October, 1851.

|         |         |       |                          |
|---------|---------|-------|--------------------------|
| 2 A. M. | 29 „ 70 | West. |                          |
| 4 „     | 29 „ 70 | „     | Fine weather throughout. |
| 6 „     | 29 „ 70 | „     |                          |
| 8 „     | 29 „ 72 | „     |                          |
| 10 „    | 29 „ 72 | „     |                          |
| 12 „    | 29 „ 72 | „     |                          |

*Abridged Report from Mr. A. BOND, Master Attendant, Balasore.**To Captain ROGERS, Superintendent of Marine, Calcutta.*

SIR,—I have the honor to report that on the 22nd inst. whilst in charge of the *Orissa* bound to Calcutta, I experienced a severe gale, similar to the Cyclone of April, 1850, by which I have lost the *Orissa's* main and fore-masts, having cut them away to save the vessel from being beached and filled, whilst drifting on shore with two anchors ahead.

On the 20th of October.—It appeared cloudy and the Bar. was at 29.66; but falling slightly, wind S. E.; I therefore ran in from the mouth of this river (thinking something must have caused the tides to be earlier by 2 hours than customary) as far as I could to get room to veer away cable, and made all snug. On the 21st, Bar. fell to 29.60 with rain but no indication of a



storm, wind E. S. E and squally at times with rain and heavy sea, five vessels ran ashore; six ran into this river.

22nd Oct.—The wind at E. and E. N. E. Bar. A. M. 29.50; at 1 P. M. Bar. 29.55; wind freshening, tried to get down the fore yard on deck, found the nut of the chain slings so jammed, that the yard could not be got down. At 3 P. M. Bar. 29.45; very squally; Brig drifting with the best bower ahead; let go the small bower, which brought her up, blowing hard E. N. E. to N. E. both anchors ahead; at 4 P. M. Bar. 29.40, very heavy sheets of rain with heavy gusts at N. E.; at 4-50 P. M. Bar. 29.20, found the vessel dragging both anchors, and the sea and river one sheet of water, cut away the fore mast which fell on the main stay and sprung the mainmast, which I also ordered to be cut away, when she brought up and held on; at 6 P. M. Bar. 29.10, wind N. E. to N. N. E. heavy rain with roaring gusts; at 8 P. M. Bar. 29.1, wind N. with similar gusts of wind and sheets of rain. The Bar. remained at 29.1 till high water, when at 9 P. M. the wind veering round from N. W. to W. the gale decreased but blew strong from the westward till 3 A. M.

23rd Oct.—A. M. at daylight found all the vessels ashore (but one) with masts gone, and some turned over which had run into the river on the 21st. Out of 24 vessels only one vessel is afloat besides the *Orissa*; 5 vessels in pieces, the rest are wrecks down the coast.

#### *Barque SCOURFIELD, CAPTAIN SKELTON.*

The Barque *Scourfield* Capt. Skelton was lying at anchor close to the Pilot vessel at the station, but had been unable to get a pilot put on board before the Cyclone commenced, and driving from her anchors, was eventually lost on the coast of Balasore Bay. A long account of her loss, and of the sufferings of her crew was published by Capt. Skelton in the Calcutta *Englishman*, which after detailing her attempts to work up to the station in company with a French ship which afterwards foundered or was lost on the sands with all hands on board, continues thus:

Tuesday, October 21st.—A fresh south easterly wind and squally. At 10 A. M. very squally with heavy swell setting in from the southward. At 11 A. M. Pilot brig passed close to us under sail, and when signalized for a Pilot, answered—"when the weather moderates." Wind kept increasing with hard squalls. At 1 P. M. bent my best topsails and courses, struck top gallant yards and made every preparation to slip, intending to do so if I saw any possibility of getting to the southward. During the night the ship rode very heavily, cable to the bare end.

*Wednesday, October 22nd.*—Blowing hard from south-east with roaring gusts. At 4 P. M. she started the anchor and dragged. I immediately let go the other and gave her 50 fathoms, which brought her up, both then appearing to have an equal strain.

Bar. rose and fell from 29.70 to 29.60. At daybreak I found by the Brig that I had dragged about 3 miles; it was then blowing a hard gale at south-east. At 8 A. M. in a tremendous pitch she parted both cables, I got her head to south-west, slipped the starboard chain, hove in the port, and set the reefed courses. About 3 hours after, the sails blew to ribbands (although nearly new) in a violent gust that also took the mizen topmast and top-gallant masts with it. Bar. at 29.50. From this time the gusts of wind became more frequent with increased strength, for each successive one brought something down; the topsails though securely stowed were gradually blown from the yards, the quarter boat was blown up the mizen rigging, the weight of which carried away the mast and it went over the side. Bar. now fell considerably. At 4 P. M. we were laid on our beam ends (although a remarkable stiff vessel), and driving to the westward, about 6 miles an hour fearfully fast, and knowing that now I could not be far from the land, I cut away the masts, deeming it the only chance for the safety of our lives, and let go the remaining anchor which we had with great exertion got over the bows and bent to it the remainder of the port chain. As soon as the masts were gone, and the ship came head to wind, it rushed in at the doors of the poop and took the deck of it clean over the taffrail, leaving the sea to finish, which it soon accomplished; sweeping away all our instruments, charts and other effects.

She continued dragging the anchor till about midnight, when it moderated; the vessel now rolled fearfully, and the wreck of boats, galley, &c. rendered it impossible to get upon deck. During the extreme violence of this hurricane, the Bar. fell below 28 inches, but it did not do so until that time. As I have lost all memoranda of it, I cannot recollect how low it did fall. This was indeed a fearful night, not one of us expected again to see daylight; but it was God's mercy to spare our lives.

*On the 23rd Oct.*—A heavy sea and fresh westerly wind, and from this time the ship utterly dismasted and without rudder, masts, chart, compass or a serviceable anchor; the stock and one fluke of the only remaining one being gone. Drifted about Balasore Bay till Wednesday the 29th when she grounded, the crew saved themselves on rafts and arrived safely at Kedgerree.

It appeared by the evidence on a trial in the Marine Court which arose out of the loss of this vessel that as early as the 19th of October, the set to the westward, at the Light vessel, which had begun in the night between

the 18th and 19th was from 1 knot to  $1\frac{1}{2}$  knot per hour during the whole of the 19th.

*Abridged Log of the Ship LUCKNOW, Capt. FAUSET, leaving the Pilot. From Calcutta bound to Demerara, with Coolies on Board—Civil Time.*

20th Oct.—Pilot left the ship at 9.30 p. m. on the 19th. Midnight squally and rain, wind variable from Eastward. Ship standing to the South and S. S. W.; 6 a. m. wind E. S. E.; 8 a. m. N. East. Noon Lat. by Acct.  $20^{\circ} 40' N.$ ; Long. Acct.  $87^{\circ} 54' East.$  p. m. Wind East; ship standing South 4 knots, cloudy weather; at 10 p. m. wind N. E.; midnight increasing with rain. Double reefs.

21st Oct.—2 a. m. strong gales N. E., but course is marked S. b. W. and the wind N. East yet only 4 knots! 2 a. m. heavy head sea; 6, heavy gales; 10 a. m. hove to. No position given at Noon. By Log worked up, she appears to be at 10 a. m. in Lat.  $19^{\circ} 13' N.$ ; Long.  $87^{\circ} 47' E.$  At noon in Lat.  $19^{\circ} 9' North$ ; Long.  $87^{\circ} 43' East.$  Strong gales with rain (direction of wind not marked) and heavy squalls. p. m. wind is marked N. W. and at 8 p. m. S. W. or veering a point in an hour. At 6, gale moderating, midnight stiff gale and cloudy.

22nd Oct.—a. m. the same; wind apparently S. W. to Noon. Making sail gradually. Noon, gale moderating. Lat.  $17^{\circ} 44' N.$ ; Long.  $87^{\circ} 30' East.$

*Abridged Log of the H. C. P. Vessel CAVERY, Mr. Branch Pilot E. BARTLETT, proceeding to the Cruizing Station—Civil Time.*

21st Oct. 1852.—Winds E. b. S. to S. E. b. S. and squally. Heavy rain with thunder and lightning from N. E. to N. W. at 8 p. m. At 1 a. m. anchored near Saugor Sand Buoy; a. m. weighed to proceed down; 11 a. m. wind S. E. b. S. blowing fresh; in 2nd reefs. Vessel now working to seaward from 18 fathoms water; midnight strong and increasing breeze from E. S. E. Bar.\* 4 a. m. 29.99; at 8h. 29.95; at Noon 29.95. At 4 p. m. 29.93; at 8h. 29.92; at midnight 29.95.

22nd Oct.—Winds from E. b. S. to W. S. W. heavy hurricane from E. S. E. to S. S. W. a. m. moderate gale from E. S. E.; 1-45, increasing; 2 a. m. in 23 fs.; at 2.30 a. m. wind oscillating from E. S. E. to S. E.; 4 a. m. in 30 fs. water; 4.30, gale increasing; daylight heavy gale and hard continued squalls from E. S. E. to S. E. and tremendous sea; topsails on the cap furled mainsail; obliged to cut away foresail. In 25 fs. water; 8 a. m. 22

\* Corrected by  $\div 0.10$  from a comparison with the Standard.

fs. water; gale increasing to a hurricane; 10 A. M. 16 fs. water. Vessel on her beam ends and settling down; cut away topmasts and lost heads of the lower masts with them; sea rising in pyramids; 11 A. M. had drifted into 12 fs. Anchored, and finally brought up in 9 fs. with two anchors. 2 P. M. wind *veered* to S. S. W. blowing with equal force, tearing the furled sails from the gaskets. 4 P. M. Bar. began to rise, but gale unabated.; 8 P. M. wind going round to the westward; midnight gale moderated at W. S. W. Bar. at 4 A. M. 29.69; at 5h. 29.65; at 6h. 29.50; at 7h. 29.40; at 8h. 29.37; at 10h. 29.30; at 4 P. M. 29.45; at 7 P. M. 29.60; at 8h. 29.75; at midnight 29.80.

23rd Oct.—Towards morning a great deal of lightning to the S. W. Position about Lat.  $20^{\circ} 44'$  N.; Long.  $87^{\circ} 20'$  East; winds variable from West to N. N. W. Bar. at 4 A. M. 29.90.

*Abridged Log, Tables, and Remarks of Mr. Branch Pilot, S. RANSOM, Commanding H. C. P. V. TAVOX, in the Eastern Channel.*

We are indebted, and very greatly so, to Mr. Ransom for the following interesting documents, of which I arrange the extracts useful to our purpose in a somewhat different form than that in which they reached me; and I abridge them also at times to economise details. The remarks given are most valuable, and cannot be read with too much attention.

From the 6th of Oct. 1852 up to the 17th—We had one delightful spell of fine weather (the *Tavoy* being stationed in the Eastern Channel); pleasant southerly breezes and a high Barometer; the 18th showed a decided change in the state of affairs, and drew my attention to it immediately. A. M. calm, sultry, Ther. higher than usual, noon squalls from North to East with excessive heavy rain, wind unsteady, and much sharp thunder and lightning. This same suspicious weather continued to increase daily up to the 20th, before the glasses became affected by it; after that the enclosed table will shew you the gradual decline of them, and although the total depression was not great, still the weather was for 24 hours very severe and the sea tremendously high, breaking, and confused, coming principally from the S. S. E. to S. E. until the wind got to the W. S. W. when it was a pyramidal mass of waves running one against the other,\* the weight of rain in the frequent fierce squalls was beyond any thing I ever witnessed; it was a sheet of falling water "*en masse*." Occupying the Floating Light station (Eastern Channel) and being at anchor, I had little else to do but to prepare my bark for the

\* The wind against the track.



evident coming struggle ; and well she behaved through the whole of it, with top gallant masts down on deck, and 160 fs. of good coir cable out ; she braved the whole without starting an inch from her position. However, I am of opinion that we did not lay in the heaviest track of this breeze although very near it. The glasses were at one time very uneasy, and a sudden fall occurred in the Marine Barometer which drew my instant attention. I thought I might have made a mistake in the reading off? but No, repeated examinations showed me I was correct, the Aneroid and Sympiesometer followed the movement subsequently, but not so quick as the Marine Barometer (by Newman, London). The abstract will show you the course of the wind from the 18th to 8 p. m. of the 23rd.

*On the 24th.*—After the weather had become fine, a strong set to the S. E. occurred and brought down with it pieces of wreck, painted yellow and white, also quantities of dried cocoanuts,\* but the most remarkable sight was the quantity of dead wild fowl, such as ducks, snipe, curlew and others ; which poor birds were literally, I believe, pressed into the sea by the sheet of falling rain I have before mentioned, many of them were about us during the gale, but could not fetch on board. There was no forked lightning during this breeze but occasionally bursts of *light*, N. E. and S. E. like the “Northern Lights” in Europe ! The Temperature of the atmosphere was also agreeable and almost constant, without any hot blasts. The crisis of the gale I should say was with us from 4 p. m. of the 22nd to 4 a. m. of the 23rd when the wind had gone round (southerly) to W. S. W. and then sulked itself out in decreasing squalls.

I have printed the following table entire, although some of the remarks are anticipated in the preceding letter. But the whole is so complete a register of the passage of a Cyclone close to the Light Vessel and of the various atmospheric disturbances and signs attending it, that I would not change any part of the record. Mr. Ransom in a subsequent letter says his Sympiesometer continues to increase in difference from the other instruments, so that it may have been a little deranged at the time of the Cyclone.

\* Which Mr. Ransom supposes must have been from the wreck of a Maldivé boat.

*An Abstract of Observations by three Instruments, from the 18th of October 1851 inclusive, being the whole period from the origin of a Cyclone to its subsidence; with the course of the wind and remarks. By Mr. B. Pilot, S. RANSOM. H. C. P. V. Tawoy, Floating Light Station, Eastern Channel.*

| Date.        | Time.    | Ther.  | Barometer<br>by<br>J. Newman.* | Aneroid by<br>E. J. Dent<br>No. 5067. | Synsometer<br>by<br>Troughion<br>and Simms. | Direction of Wind.      | Remarks.                                                                                          |
|--------------|----------|--------|--------------------------------|---------------------------------------|---------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------|
| Oct.<br>18th | 8 A. M.  | 85.0   | 30.136 Ins.                    | 30.18 Ins.                            | 30.60 Ins.                                  | Calm.                   | Daylight calm and sultry; clouds collecting to the N. E.                                          |
|              | 2 P. M.  | 82.30  | 29.926                         | " .10                                 | " .57                                       | North to East.          | noon a fresh squall from the Northward, going to the East-                                        |
|              | 8 P. M.  | 83.30  | " .996                         | " .15                                 | " .66                                       | E. N. E. to E. S. E.    | ward; heavy rain, thunder and lightning. P. M. dark cloudy<br>weather, wind moderate. Sea smooth. |
| 19th         | 8 A. M.  | 82.00  | " .966                         | " .15                                 | " .68                                       | North to E. S. E.       | Increasing Breezes and squally weather; wind variable from                                        |
|              | 2 P. M.  | 82.00  | " .886                         | " .07                                 | " .55                                       | E. S. E.                | North to E. S. E. P. M. The squalls gathering strength,                                           |
|              | 8 P. M.  | 83.00  | " .956                         | " .12                                 | " .66                                       | E. S. E.                | veered to 100 fms. cable.                                                                         |
| 20th         | 8 A. M.  | 81.00  | " .966                         | " .15                                 | " .70                                       | E. S. E.                | Increasing Breezes with frequent hard squalls and heavy                                           |
|              | 2 P. M.  | 79.30  | " .856                         | " .07                                 | " .60                                       | E. S. E.                | rain during them, sea beginning to rise, sent down top                                            |
|              | 8 P. M.  | 80.30  | " .876                         | " .07                                 | " .62                                       | E. S. E.                | gallant masts and rigging.                                                                        |
| 21st         | 8 A. M.  | 81.00  | " .846                         | " .04                                 | " .57                                       | E. S. E. to S. E.       | Blowing hard E. S. E. to S. E. Wind unsteady at times and                                         |
|              | 2 P. M.  | 80.30  | " .776                         | 29.98                                 | " .48                                       | S. E. to S. S. E. back. | gusty, clouds dense, atmosphere dark and gloomy, evident                                          |
|              | 8 P. M.  | 81.30  | " .806                         | 30.00                                 | " .56                                       | to S. E.                | symptoms of worse weather approaching; veered to 160<br>fms. cable and made all preparations.     |
| 22d          | 8 A. M.  | 81.00  | " .786                         | 29.98                                 | " .54                                       | E. S. E. to S. E.       | Blowing a gale, (not hard) but hourly increasing; a very                                          |
|              | 10 A. M. | 80.45  | " .756                         | " .96                                 | " .54                                       | S. S. E.                | high Sea coming in from S. E. Noon blowing a heavy gale,                                          |
|              | Noon.    | 80.45  | " .666                         | " .90                                 | " .46                                       | South.                  | and the Sea breaking dangerously.                                                                 |
| 22d          | 2 P. M.  | 80.45  | " .566                         | " .87                                 | " .44                                       | "                       | P. M. A severe gale and tremendous cross Sea, the rain                                            |
|              | 4 P. M.  | 80.30  | " .536                         | " .85                                 | " .38                                       | "                       | which fell in the squalls now was more like sheets of water,                                      |
|              | 6 P. M.  | 80.20  | " .556                         | " .83                                 | " .36                                       | S. S. W.                | Sent down everything from aloft that would hold wind.                                             |
| 22d          | 8 P. M.  | 80.20  | " .656                         | " .88                                 | " .45                                       | S. S. W.                | several extraordinary flashes of light in the S. E. and N.                                        |
|              | 10 P. M. | 80.00  | " .606                         | " .85                                 | " .40                                       | S. S. W.                | E. similar to the Northern lights.                                                                |
|              | Midnt.   | 80.00  | " .556                         | " .80                                 | " .34                                       | S. S. W.                |                                                                                                   |
| 23d          | 2 A. M.  | 80.00  | " .556                         | " .80                                 | " .34                                       | S. S. W.                | A severe gale, with a high dangerous breaking Sea running,                                        |
|              | 4 A. M.  | 80.00  | " .606                         | " .82                                 | " .36                                       | S. S. W.                | several broke on board, that did no damage, beyond driv-                                          |
|              | 6 A. M.  | 80.00  | " .646                         | " .85                                 | " .45                                       | S. S. W.                | ing in a bulls eye. From 4 P. M. of the 2nd to 4 A. M. of 23d                                     |
| 23d          | 8 A. M.  | 80.00  | " .656                         | " .86                                 | " .47                                       | S. S. W.                | I consider we had the hardest of this gale, and when the                                          |
|              | 10 A. M. | 80.00  | " .676                         | " .88                                 | " .52                                       | W. S. W.                | wind got to the W. S. W. The Sea was heavy and pyrami-                                            |
|              | Noon.    | 80.00  | " .656                         | " .88                                 | " .48                                       | West.                   | dical, causing the vessel to labor much, but throughout the                                       |
| 23d          | 2 P. M.  | 80.00  | " .666                         | " .88                                 | " .48                                       | W. N. W.                | whole of the breeze she did not start an inch from her                                            |
|              | 4 P. M.  | 79.30  | " .806                         | " .99                                 | " .57                                       | N. W.                   | anchorage, the Floating Light buoy bearing the same when                                          |
|              | 8 P. M.  |        |                                |                                       |                                             |                         | the weather broke, as at its commencement. The Salween                                            |
| 21st<br>22d  | 8 P. M.  |        | Depression,<br>29.86           | Depression,<br>30.0                   | Depression,<br>30.56                        |                         | P. V. drove about 2 miles to the N. E. with the W. S. W.                                          |
|              | 4 P. M.  |        | 29.536                         | 29.80                                 | .34                                         |                         | part of the breeze.                                                                               |
|              | Fall in  | 20 hs. | .270                           | in 28 hs. 20                          | in 28 hs. 22                                |                         |                                                                                                   |

\* Correction of +0.056 made to the original, being that required by a comparison with the Standard. — H. P.

*Abridged Extract from the Log of the H. C. Floating Light Vessel  
HOPE, Commander H. HILLER; at the Saugor Point Station—Civil  
Time.*

21st Oct. 1852.—A. M. moderate N. East winds, cloudy and rain; 8 A. M. stronger winds; dirty looking weather. Noon wind increasing at East cloudy and squally with passing showers. 4 P. M. strong S. S. E. winds and cloudy dirty weather with frequent heavy squalls: sunset the same; 8 P. M. blowing hard at S. E. b. S. attended with heavy squalls, thunder, lightning and rain and a heavy sea; 10 P. M. veered to 115 fathoms cable. From 9 P. M. to midnight heavy gale at S. S. E. attended with a heavy sea and heavy gusts, and cloudy dirty weather with rain. Aneroid morning\* (9 A. M.?) 30.40; Ther. 75°; † Bar. A 29.80; Ther. 80°; Bar. B 29.85; Ther. 81°. Noon Aneroid 30.37; Ther. 74°; Bar. A 29.75; Ther. 80°; Bar. B 29.85; Ther. 82°. Night (8 P. M.?) Aneroid 30.75; Ther. 78°; Bar. A At 29.70; Ther. 80°; Bar. B 29.81; Ther. 80°.

22nd October.—Strong S. S. E. gales, heavy sea, squally and rain to 8 A. M. Daylight to noon, the same, with thick dirty cloudy weather. Sunset, gale increasing to a hurricane attended with heavy squalls, and a heavy sea. At 6 P. M. driving, let go the second anchor, but the chain of the larboard anchor fouling and cutting the coir cable slipped it, 8 P. M. wind S. S. E. midnight a complete hurricane at S. S. E. with heavy squalls and a heavy sea with thick weather. Aneroid morning 30.40; Ther. 75°; Bar. A 29.81; Ther. 86°; Bar. B 29.85; Ther. 82°; 8 A. M. Aneroid 30.35; Ther. 76°; Bar. A. 29.75; Ther. 84°; Bar. B 29.80; Ther. 82°; 4 P. M. Aneroid 30.20; Ther. 76°; Bar. A 29.51; Ther. 85°; Bar. B 29.75—82. Midnight, Aneroid 30.10; Ther. 75°; Bar. A 29.10; Ther. 82°; Bar. B 29.10; Ther. 80°.

23rd Oct.—A. M. Blowing a complete hurricane at S. S. E. with terrific squalls and thick weather, heavy rain and sea. 1 A. M. a heavy squall struck the vessel and laid her on her beam ends washing away quarter boat; 8.40 A. M. vessel took the ground striking heavily; weather, so thick that no land could be seen; 8 A. M. hurricane “shifted to the westward with terrific squalls;” 9 A. M. cleared a little, found her on shore, a little to the northward at Fakeer’s Creek with 4 feet water in the hold. Three men of a Maldivian vessel with 42 hands on board, which had foundered, and the crew of the Barque *Bengalee*, came in sight. Noon more moderate at West; 8 P. M. strong W. N. W. winds. From A. M. to 4 A. M. the Aneroid fell from 30.10

\* Morning and night; so given throughout! I suppose at 9 A. M. and 8 P. M. are meant?

† So in MSS.

to 29.50 and then commenced to rise gradually. Barometer fell from 29.10 to 28.33; and then commenced to rise gradually.

*Abridged Log of the Ship VIRGINIE, CAPT. JURAS, from Calcutta bound to Madras and proceeding down the River. Log from Mr. Mate Pilot Alfred Bond. In Saugor Roads.*

21st Oct. 1852.—At anchor in Saugor Roads. Fresh breezes from E. b. N. to East, and E. S. E. with hard squalls and heavy rain throughout the 24 hours. Bar. at midnight 29.75. Noon 29.76. Midnight 21st—22nd 29.68.

22nd Oct.—Midnight strong breezes S. East; and cloudy; Bar. 29.68 at 1 A. M.; at 4 A. M. 29.65; at 8 29.60. At 6 A. M. wind S. E. b. E. Increasing bad weather appearances to Noon. All preparations made for it. 1 P. M. Bar. 29.57; 3h. 29.55; at 4h. 29.54; at 7h. 29.50; at 9h. 29.47; at 11h. 29.37; at midnight 29.30. At sunset thick and hazy with heavy banks of clouds to the south; sun of a pale brick colour; 9 P. M. driving; let go a second anchor; 11 P. M. gale increased to a hurricane blowing in terrific gusts, with a high short sea making a complete breach over all. At 11.40 cut away fore and main masts for the safety of the ship, lost bowsprit and mizen topmast.

23rd Oct.—Midnight the wind terrific, and to be compared to nothing but howlings and shriekings; the sky black, the sea rising in large masses in appearance like a wall approaching the ship, of a dull glowing muddy colour. The spray a continued sheet passing over the ship; 3 A. M. the height of the hurricane, gusts terrific, blowing away the boats, &c.; sea rising in pyramids, ship rolling deeply and nearly foundering at her anchors during the night; having 7 ft. water in the hold and throwing cargo over board. During these 24 hours the wind is marked at 1 A. M. South; at 2h. S. S. W. at 3h. West; at 5h. W. b. N.; at 6h. W. N. W.; at 7h. N. West; at Noon North; at 2 P. M. N. b. E.; at 5h. N. N. E.; at 7h. N. E.; at 8h. East and at 9h. S. East to midnight again. The Barometer is carefully registered for this day as follows:—

|         |        |         |        |
|---------|--------|---------|--------|
| 1 A. M. | 29.14. | 1 P. M. | 29.47. |
| 2       | 28.80. |         | 49.    |
| 3       | 65.    |         | 53.    |
| 4       | 68.    |         | 53.    |
| 5       | 82.    |         | 54.    |
| 6       | 29.10. |         | 54.    |
| 7       | 22.    |         | 55.    |



| 8 A. M. 2930. | 1 P. M. 29.55. |
|---------------|----------------|
| 9 33.         | 55.            |
| 10 39.        | 56.            |
| 11 43.        | 57.            |
| 12 45.        | 57.            |

Thermometer not marked.\*

Before daylight observed several broad glaring patches in the sky, of a pale reddish colour. Daylight hurricane, but steady, not in gusts; ship a complete wreck. 6 A. M. the wind from a hurricane decreased to a severe gale in heavy gusts, the sea a heavy surf sweeping the decks continually and destroying and carrying every thing before it. At 10 A. M. decreasing with a partial break in the sky. Noon clearing up. An American ship and the Barque *Bengalee* at anchor with loss of main and mizen masts, and the Floating Light on shore.

*Abridged Statement from the American "Ship WM. STURGIS" in Saugor Roads outward bound.—Civil Time.*

*On Sunday the 19th Oct.*—Came to anchor in Saugor roads and discharged steamer. On the 20th and 21st remaining at anchor in Saugor roads, weather squally and threatening, with rain and thunder and lightning.

*Oct. 22nd.*—Commences with heavy rain and moderate easterly breezes. At 2 P. M. wind increasing, made all preparations; 6 P. M. let go the star-board anchor and veered away on both cables; day ends with violent gales from E. to S. E. by S. with heavy rain.

*Oct. 23rd.*—Commencing this day at midnight; veered out the whole of both bower cables, gale increasing and a heavy sea bearing in from the southward. At 2.30 A. M. the wind veering from E. N. E. to S. and blowing with terrific violence, the ship commenced driving with both anchors; at 3 A. M. the ship still driving broadside to the wind. Mizen sands close to leeward, lee rail under water and the sea breaking over fore and aft, it was deemed proper to cut away the masts as the only means of saving ship cargo and lives on board.

The main and mizen masts were immediately cut away but the ship continued to drive. Then cut away the weather fore topmast back stays, and when the topmast fell over the side the anchors took effect, bringing the ship head to wind, fetching the bows under and sweeping her decks fore and aft; sounded in  $4\frac{3}{4}$  fathoms. From this time until daylight, employed clearing the wreck. At 6 A. M. *the wind lulled for a few moments and then struck*

\* I was unable to obtain any comparison with this ship's Barometer and the Standard.

from S. W. blowing with increased violence until 9 A. M. when the gale broke with wind at N. W.

*Abridged Log of the Peninsular and Oriental Company's Steam Ship*  
*PRÆCURSOR, Capt. GRIFFIN, at Cowcolly during the Cyclone.—Civil*  
*Time.*

On the 22nd Oct. 1851.—At 9.45 A. M. anchored, with Cowcolly bearing West and lower Buoy of the Auckland Channel E. S. E. in  $8\frac{1}{4}$  fs. wind at E. S. E. Heavy rain and thick windy weather. Bar. at 8 A. M. 29.905; \* at Noon 29.80; Ther. 80°. P. M. heavy rain, wind E. S. E. to S. E. and at 4 P. M. E. S. E. Bar. at 4 P. M. 29.945; 6 P. M. ship had dragged a little, wind blowing strong in squalls; at 8, Cowcolly light W.  $\frac{3}{4}$  S. About 9 P. M. light not visible, increasing gale to midnight. Bar. at 8 P. M. 29.785; Ther. 78°; at 11h. 29.385; midnight 29.285; hard gale with very strong gusts S. E. to S. S. E.

23rd Oct.—Gale increasing, stern boat blown to pieces; 2 A. M. terrific squalls of wind and rain. Wind marked as S. Easterly to Noon; steaming full power ahead to relieve strain on the cables which were both veered out and both ahead. At 3.30 A. M., during a perfect hurricane, both cables parted and at 4, grounded on the mud bank carrying away the rudder. At 4.30 A. M. wind suddenly lulled having been steady at S. S. E. but at 5, blowing furiously from N. E. to N. West. 4.30 A. M. [† Barometers rising astonishingly fast; “5, wind lulled. Set on, but wind chopped round suddenly to N. N. E. veering to N. W. blowing harder than before. Reversed the engines to keep the vessel on the bank, it being evident to all on board that had she been blown off the flat, no anchors could have held her and she must have been driven on to the Reefs, the Long sand, or the Mizen.”†] At 9 A. M. the wind again lulled and a moderate breeze commenced from N. W. Vessel on shore, with Cowcolly light house bearing W. S. W. Got afloat on the 24th. Barometer for this day as follows:

| Bar.            | Ther. | Bar.            | Ther. |
|-----------------|-------|-----------------|-------|
| 1 A. M. 29.175  | 78°   | 6 A. M. 28.835  | 78°   |
| 2        28.955 | ..    | 7        .985   | ..    |
| 3        .685   | ..    | 8        29.085 | 78°   |
| 4        .585   | ..    | 9        .395   | ..    |
| 5        .685   | ..    | Noon    .915    | 82°   |

\* The Barometer is corrected throughout by the addition of  $\pm 0.085$  being its error by a comparison with the Standard. Some additions are made to the log from a MS. report of the Pilot, Mr. Beaumont,

† Pilot's notes within these brackets and † s.

*Abridged Log of the H. C. Buoy Vessel GRAPPLER, Mr. Branch  
Pilot, J. H. CHALKE, at Kedgeree.—Civil Time.*

The H. C. Buoy Vessel *Grappler* was also blown on shore close to the *Precursor*, and Mr. Chalke has favoured me with a precise report with an excellent series of Barometric Observations, and a comparison for their correction.

*Extracts from the H. C. B. V. Grappler's Log of the 21st, 22nd and  
23rd October, at anchor in Kedgeree Roads.*

| <i>Barometer.*</i> |       |        | <i>Winds, weather and other remarks on the<br/>21st October.</i> |
|--------------------|-------|--------|------------------------------------------------------------------|
| 6.30               | A. M. | 29.878 | Fresh N. E. to East with squalls and rain first part.            |
| 10.30              | „     | 29.870 | Latter part hard squalls from east to S. E. with rain.           |
| 4.00               | P. M. | 29.828 |                                                                  |
| 8.00               | „     | 29.848 |                                                                  |
| <i>Barometer.</i>  |       |        | <i>22nd October.</i>                                             |
| 6.00               | A. M. | 29.848 | A. M. hard squalls from eastward with rain, to 7.0 P. M.         |
| 10.30              | „     | 29.873 | blowing in squalls with thick rain from E. N. E. to S. E.        |
| 3.00               | P. M. | 29.758 | To midnight severe gales from S. E. to E. N. E., hard            |
| 4.00               | „     | 29.708 | squalls of dense thick impenetrable rain.                        |
| 5.00               | „     | 29.658 |                                                                  |
| 6.00               | „     | 29.608 |                                                                  |
| 7.00               | „     | 29.508 |                                                                  |
| 8.00               | „     | 29.478 |                                                                  |
| 9.00               | „     | 29.388 |                                                                  |
| 10.00              | „     | 29.368 |                                                                  |
| 11.00              | „     | 29.228 |                                                                  |
| 12.00              | „     | 28.988 |                                                                  |
| <i>Barometer.</i>  |       |        | <i>23rd October.</i>                                             |
| 1.00               | A. M. | 28.888 | A. M. 2.00 blowing a gale from S. E. to E. N. E. increas-        |
| 2.00               | „     | 28.688 | ing in strength every moment with dense rain 4.00. A. M.         |
| 3.00               | „     | 28.748 | blowing a hurricane, it being impossible to move on              |
| 4.00               | „     | 28.978 | deck to windward. Dense rain 6.00 A. M. moderating               |
| 5.00               | „     | 29.028 | and veering to the northward. At whence it suddenly              |
| 6.00               | „     | 29.288 | came down with fearful violence from the N. N. West-             |

\* Corrected to the Standard (by  $-.012$ ).—H. P.

*Barometer.*

23rd October.

|       |       |        |                                                      |
|-------|-------|--------|------------------------------------------------------|
| 7.00  | A. M. | 29.388 | ward until 9.30 A. M. when it began to moderate com- |
| 8.00  | „     | 29.438 | ing round to W. N. W. Noon moderating considerably   |
| 9.00  | „     | 29.468 | P. M. 4.00 fresh. W. by N, breeze.                   |
| 10.00 | „     | 29.528 |                                                      |
| 11.00 | „     | 29.578 |                                                      |
| 12.00 | „     | 29.598 |                                                      |
| 4.00  | P. M. | 29.658 |                                                      |
| 8.00  | „     | 29.738 |                                                      |

J. H. CHALKE,  
Commander, Grappler.

*A Register of two Barometers; one by Calderara the other by Troughton and Simms; a Sympiesometer with Thermometer attached by Troughton and Simms; and an Aneroid by Dent; during the Hurricane of October 22nd and 23rd, 1851, by Mr. B. Pilot, A. BEDFORD, River Surveyor, H. C. Surv. Brig Megna, off Mud Point.*

| <i>Date.</i> | <i>Hour.</i> | <i>Ther.</i> | <i>Symp.</i> | <i>Aneroid.</i> | <i>Calde-<br/>rara<br/>Bar.</i> | <i>T. and<br/>Simms<br/>Bar.</i> | <i>Wind.</i> | <i>Remarks.</i>                                                                                                               |
|--------------|--------------|--------------|--------------|-----------------|---------------------------------|----------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1851<br>Oct. |              |              |              |                 | +0.227<br>Corr.                 | +0.024<br>Corr.*                 |              |                                                                                                                               |
| 21st         | 8 A. M.      | 79°.0        | 30.88        | 30.03           | 29.75                           | 30.01                            | N. E.        | } Moderate breeze<br>and cloudy.<br>Very gloomy and<br>threatening all<br>round with passing<br>squalls from the<br>eastward. |
|              | 2 P. M.      | 80.          | 30.78        | 30.02           | 29.73                           | 30.00                            | Ditto.       |                                                                                                                               |
|              | 8 P. M.      | 80.          | 30.76        | 30.02           | 29.73                           | 30.00                            | Easterly.    |                                                                                                                               |
| 22nd         | 6 A. M.      | 79.5         | 30.68        | 29.92           | 29.60                           | 29.90                            | East.        | Squalls, with thick<br>hazy weather.                                                                                          |
|              | 8            | 79.5         | 30.74        | 29.97           | 29.68                           | 29.92                            | Ditto.       | Ditto ditto.                                                                                                                  |
|              | 10           | 79.5         | 30.74        | 30.00           | 29.68                           | 29.93                            | Ditto.       | Ditto ditto.                                                                                                                  |
|              | 12 Noon.     | 78.5         | 30.70        | 29.95           | 29.66                           | 29.90                            | Ditto.       | Much rain, very<br>hazy.                                                                                                      |
|              | 2 P. M.      | 78.0         | 30.62        | 29.90           | 29.60                           | 29.86                            | N. E.        | } Hard squalls with<br>much rain.                                                                                             |
|              | 4            | 78.0         | 30.60        | 29.85           | 29.57                           | 29.81                            | E. N. E.     |                                                                                                                               |
|              | 6            | 78.5         | 30.58        | 29.82           | 29.54                           | 29.78                            | S. S. E.     | Gale commenced.                                                                                                               |
|              | 8            | 79.4         | 30.55        | 29.82           | 29.53                           | 29.79                            | Ditto.       | Gale, hard gusts.                                                                                                             |

\* Mr. Bedford's table is given as it reached me to allow of the comparison with the Sympiesometer. To compare his Barometer with others, the corrections marked must be made. I regret being unable to give his valuable projection but I shall use it in another place.—H. P.



| Date. | Hour.    | Ther. | Symp. | Aneroid. | Calde-<br>rara<br>Bar. | T. and<br>Simms<br>Bar. | Wind.    | Remarks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------|----------|-------|-------|----------|------------------------|-------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23rd  | 10       | 79.8  | 30.50 | 29.80    | 29.50                  | 29.76                   | E. S. E. | Hurricane with oc-<br>casional lulls, spit-<br>ting rain with<br>heavy scud.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|       | 12       | 80.0  | 30.44 | 29.72    | 29.45                  | 29.70                   | East.    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 1 A. M.  | 79.8  | 30.38 | 29.66    | 29.39                  | 29.62                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 2        | 79.5  | 30.32 | 29.60    | 29.32                  | 29.56                   | E. b. S. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 3        | 79.2  | 30.24 | 29.51    | 29.25                  | 29.47                   | Ditto.   | From 4 to 6 was the<br>hardest part of the<br>hurricane, it was<br>screaming the<br>most fearful note I<br>ever heard. Vessel<br>often with her lee<br>rail under water,<br>gradually pressed<br>down by force of<br>wind only, lower<br>masts bending like<br>twigs, sky and<br>water mixed, form-<br>ing a mad boiling<br>surge in which we<br>were helpless.<br>At 7 it moderated<br>for a short interval<br>A Sudden shift, and<br>blew as hard as<br>ever.<br>Slightly moderat-<br>ing.<br>Much more mo-<br>derate.<br>Ditto ditto.<br>Close reefed, topsail<br>breeze.<br>Sea going down fast<br>Fresh breeze.<br>Ditto and clear.<br>More moderate.<br>Clearing away fast.<br>Moderate breeze<br>and fine.<br>Ditto ditto. |
|       | 4        | 79.0  | 30.08 | 29.40    | 29.14                  | 29.34                   | E. S. E. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 5        | 79.0  | 29.88 | 29.18    | 28.94                  | 29.18                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 6        | 79.0  | 29.56 | 28.80    | 28.60                  | 28.78                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 7        | 79.0  | 29.52 | 28.85    | 28.65                  | 28.81                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 8        | 79.0  | 29.73 | 28.92    | 28.70                  | 28.92                   | North.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 9        | 78.8  | 30.05 | 29.30    | 29.06                  | 29.32                   | N. N. E. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 10       | 78.5  | 30.28 | 29.56    | 29.25                  | 29.50                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 11       | 78.5  | 30.40 | 29.62    | 29.35                  | 29.60                   | N. N. W. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 12 Noon. | 78.0  | 30.47 | 29.68    | 29.39                  | 29.63                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 1 P. M.  | 78.0  | 30.50 | 29.70    | 29.43                  | 29.66                   | N. W.    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 2        | 78.0  | 30.53 | 29.72    | 29.45                  | 29.70                   | NW b. W. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 3        | 77.7  | 30.53 | 29.76    | 29.47                  | 29.71                   | N. W.    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 4        | 78.0  | 30.55 | 29.78    | 29.48                  | 29.73                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 5        | 78.3  | 30.58 | 29.80    | 29.49                  | 29.77                   | W. N. W. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 6        | 78.2  | 30.62 | 29.82    | 29.53                  | 29.80                   | West.    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       | 8        | 78.0  | 30.62 | 29.85    | 29.58                  | 29.83                   | Ditto.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

The vessel's position when the above were taken, was about  $1\frac{1}{2}$  miles S. W. of Mud Point, they were all either taken, or their accuracy ascertained by myself. Some latitude must however be given for the direction of the wind which I found difficult to obtain, except when it was right ahead. I do not think the error would amount to more than one or two points.

The projection of the above register would seem to shew that the Aneroid will bear a very fair comparison with the Sympiesometer in these gales, both in its range and sensitiveness it was when first received regulated by the standard Barometer at the Surveyor General's Office. The Sympiesometer, you may observe, is a very high one.

A. BEDFORD,  
River Surveyor, Commdg. Megna Steam Vessel.

*Abridged Log of H. M. S. Fox, Commodore G. LAMBERT, lying at Diamond Harbour.—Civil Time.*

22nd Oct.—A. M. overcast, showery and gloomy. Wind Easterly (3).\* 8 A. M. (2) the same weather, Bar. corrected 29.805; Noon 29.715; Ther. 70°. P. M. wind easterly (6) weather as before; 5 P. M. Bar. 29.685; Ther. 80°; 6 P. M. wind S. easterly (7); 8 P. M. east (9). Overcast, squally, rain, and thunder and lightning; midnight the same force (10); Bar. 29.585; Ther. 79°.

23rd Oct.—A. M. rain, squally and thick weather. Wind E. S. E.; force (10) to (11) and (10) again at 4 A. M. Bar. at 1h. A. M. 29.555; at 2h. 29.535; at 3h. 29.485; at 4h. 455; 2 A. M. down top gallant masts, and at 7 A. M. pointed yards to the wind, ugly weather; veered to 80 fs. cable. At 8 A. M. wind N. E. (10) Bar. 29.385; at 9h. 29.375; at 10h. 29.375; at 11h. 29.435; at Noon 29.455; Ther. 78°; at 10 A. M. wind North (10); Noon N. N. W. (10); P. M. N. W. b. N. (9). Overcast, misty, gloomy, and rain; at 4h. N. W. b. N. (8); at 6, N. W. b. N. (6). Bar. at 2 P. M. 29.505; at 4h. 29.555; at 6h. 29.635; at 8h. 29.655; at midnight 29.705. Clear and cloudy.

*The following are my own observations at Calcutta, the Barometer being corrected to that of the Surveyor General's Office but with no correction for Temperature, &c.*

Wednesday, 22nd Oct. 1851.—For the last two days weather suspicious with light drizzling showers; heavy overcast sky, breaking at times into clear blue spaces, varied by cirri and cirro-strati

21st Oct.—Wind in light squalls and puffs from N. to N. E. scud from East and N. East.

22nd Oct.—At 6½ A. M. light squally breezes and puffs N. to N. N. E. and N. N. W. Scud thick and frequent, and a low smoky scud below all from the N. East, driving moderately, but not *very* fast, Bar. 29.859; Symp. 29.95; Ther. 79°. Scud at times from the S. E. and arched squalls, with very little wind in them, from the Eastward.

9 A. M. Bar. 29.959; Symp. 30.00; Ther. 79°. Calm. Heavy banks to S. E. and South.

5 P. M. squally breeze from N. East with light rain. Sky overcast, low smoky scud, travelling rather rapidly from N. E.; heavy rain. Bar. 29.829; Symp. 29.90; 6h. 10' P. M. the same as at 5 P. M.; 7h. P. M. Bar. 29.819; Symp. 29.91. Ther. 79°.

23rd Oct.—6 A. M. Bar. 29.719; Symp. 29.83; Ther. 78½°. Blowing a fresh steady gale from E. N. E. to N. E. with continued rain during the night, wind and rain gradually increasing. Scud from E. b. S. and E. S. E. ½ p.; 8 A. M. gale force (8—9) E. N. E. to E. b. N. strong squalls and rain. Scud from about East.

\* Force by Admiral Beaufort's scale. The Barometer is corrected by a careful comparison with the standard giving —0.015 as the correction.

9h.15' A. M. Bar. 29.679; Symp. 29.80; Ther. 78°. Wind N. E. (8—9). Squalls strong (9—10). Scud from N. East! 10h.15' A. M. Bar. 29.579; Symp. 29.78; Ther. 78°.

11h.15' Bar. 29.629; Symp. 29.78; Ther. 78 $\frac{1}{4}$ °; Noon Bar. 29.639; Symp. 29.77; Ther. 78 $\frac{1}{4}$ °. Squalls less severe and less rain with more light at times; clouds more in masses. Wind N. b. E.! Scud from N. East.

1 P. M. Bar. 29.629; Symp. 29.76; Ther. 78 $\frac{1}{4}$ °. Scud from N. N. E. Wind North and N. b. W.

2 P. M. Bar. 29.609; Symp. 29.76. Scud from N. b. E. Wind North to N. W.!

3 P. M. Bar. 29.619; Symp. 29.78; Ther. 78 $\frac{1}{2}$ °. Wind much abated and N. N. W. to N. W. but the scud still from N. b. E. Clouds darker but less rain.

4 P. M. Bar. 29.629; Symp. 29.79; Ther. 78 $\frac{1}{4}$ °. Scud from North. Wind N. W. to N. N. W.\*

7 P. M. wind about N. W. and in slight squalls only, Bar. 29.739; Symp. 29.85; Ther. 78°.

#### SURVEYOR GENERAL'S OFFICE.

*The following table is extracted from the monthly register kept at the Surveyor General's Office. Bar. corrected to 32° Fahr.*

#### TIME OF OBSERVATION.

| Date. | Sunrise.   |              | 9 h. 50 m. |              | Noon.      |              | 2.40 P. M. |              | 4 h. P. M. |              | Sunset.    |              |
|-------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|
|       | Barometer. | Thermometer. | Barometer. | Thermometer. | Barometer. | Thermometer. | Barometer. | Thermometer. | Barometer. | Thermometer. | Barometer. | Thermometer. |
| 1850  |            |              |            |              |            |              |            |              |            |              |            |              |
| Oct.  |            | °            |            | °            |            | °            |            | °            |            | °            |            | °            |
| 19th  | 29.868     | 78.3         | .922       | 83.6         | .863       | 85.0         | .798       | 84.0         | .806       | 81.2         | .831       | 79.0         |
| 20th  | .849       | 77.4         | .884       | 80.6         | .819       | 82.6         | .855       | 79.0         | .751       | 79.2         | .759       | 78.6         |
| 21st  | .777       | 76.6         | .819       | 81.3         | .776       | 77.8         | .719       | 78.5         | .710       | 80.0         | .722       | 79.0         |
| 22nd  | .752       | 76.8         | .806       | 78.7         | .765       | 75.5         | .692       | 75.3         | .667       | 76.2         | .663       | 76.2†        |
| 23rd  | .564       | 76.0         | .520       | 70.6         | .475       | 76.6         | .488       | 78.0         | .515       | 77.6         | .555       | 78.0         |
| 24th  | .705       | 75.6         | .771       | 80.0         | .730       | 83.0         | .662       | 86.0         | .668       | 85.8         | .679       | 83.8         |
| 25th  | .791       | 77.8         | .863       | 84.3         | .819       | 86.2         | .774       | 87.4         | .764       | 86.3         | .812       | 83.8         |

\* These are the same points as in the preceding entry, but the order of them is designedly changed to express that *generally* the wind was from the first point or N. W., but at times, either from incurving or from the eddies over a town, veering to N. N. W.: so in the entry at 3 P. M. N. N. W. to N. W. means that generally the wind was N. N. W., but at times N. West.

† Fall of rain nearly 12 inches.

*Substance of letters from Noacolly in Lat. 22.53' N. Long. 90.54' East. Communicated by Dr. BAKER.*

No. 1. "We have had one of the most severe hurricanes that has been known here since 1829. It commenced about 6 o'clock on the evening of the 23rd; increasing till midnight when it blew a complete hurricane until 5 A. M. of the 24th; the damage done and loss of life is said to be very great. It commenced from the S. E. passed on the South and terminated with the wind at S. W.

No. 2. "Hatteah and Sundee\* have escaped pretty well, but Siddee (an island between Sundee and the mainland) and Bouring on the mainland have suffered considerably in crops, cattle and some loss of inhabitants.

No. 3. "Since my last I have seen a letter from Chittagong. The gale was much more moderate at that place. They had very high tides and squally weather, not amounting to a gale, on the 23rd and 24th. Accounts from Noacolly continue to add to those received of the devastations of the Cyclone in that quarter. The loss of human life is very great. Nearly two hundred corpses were counted in the creek leading up to the station. They had floated up with the tide, with numbers of cattle, deer, tigers, buffaloes, &c."

#### CHITTAGONG.

*Letter from A. SCONCE, Esq., C. S., Judge of Chittagong.*

"In case no account of our Chittagong weather during the late Cyclone may have reached you, perhaps my notes may be acceptable.

"The weather being previously fine, a change was first observable on the afternoon and evening of the 18th Oct.; there was a heavy, dirty looking bank to Southward. At night it rained; rained almost all the 19th lightly; with little wind S. to S. E. 21st and 22nd overcast with clouds: air still or nearly so; on 23rd wind at S. E. Morning and forenoon, heavy clouds rising W. and S. W. veering to N.; at noon heavy in the N. W. and thundering.† From 1 to 3 P. M. wind S. to S. E. squally with rain; evening squalls heavier: before midnight, wind rose; blew very strong (apparently) S. E. perhaps nearer E. than to S. and so far as I could observe from 4 A. M. of 24th veered round to S. W.; at 6 A. M. of the 24th blew strong from S. W.; at breakfast, wind began to fall. On the 23rd, 3.18 inches rain fell. My Barometer being broken, I can give no account of it.

\* Islands at the mouth of the Burrampooter.

† This is worthy of note.—H. P.



"The only point which this statement may be found perhaps usefully to illustrate is this, that the gale or Cyclone took 24 hours to come from Kedgeriee to Chittagong. The *Precursor* had it on the night of Wednesday, we had it on the night of Thursday."

*Extract of a letter from E. CRASTER, Esq. Acting Collector of Chittagong.*

"The weather for some days previous to the 23rd Oct. had been gloomy and threatening with occasional falls of rain, not, however, in any great quantity, the Southern horizon in particular continuing overcast with a mass of heavy leaden-coloured clouds; and men of experience on the coast predicted the occurrence of a gale, fixing the probable period as about that of the change of the moon.

On Thursday the 23rd Oct. the wind blew pretty fresh throughout the day from the Southward, gradually increasing as the evening closed in, rain also fell occasionally, but more in the form of driving mist, than that of actual rain.

About 10 P. M. the wind freshened up suddenly from about S. E. by South, and at that point the gale commenced, accompanied with a heavy fall of rain; it continued increasing in violence until about 2 A. M.; when it appeared to have attained its height, the direction of the wind gradually changing from the point at which the gale commenced, and drawing round by South towards West, from which last quarter it was blowing hard at 7 A. M.; after this time the gale abated; a moderate breeze from the North-West continuing throughout the day. The quantity of rain which fell during the gale was 3 inches 23 cent."

In a subsequent letter, in reply to some enquiries, Mr. Craster informs me that the Master Attendant's Barometers were at about 29.50. And he confirms also the foregoing accounts of the devastations occasioned by the high tide (Storm Wave?) along the Eastern shore of the Burrampooter; he says that three hundred persons and thousands of cattle are reported to have been drowned.

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I now give for the purposes of ready comparison as usual, the comparative table of winds and weather with the different vessels and at the shore stations.

Comparative Table of Winds and Weather from the 20th to the 24th October 1851. Precursor's Cyclone.

| Date.              | Name of Ship or Station.          | Lat. N.                  | Long. East. | Winds and Weather.                                                    | Bar.                 | Symp.                | Ther.          | Remarks.                                                                                                                 |
|--------------------|-----------------------------------|--------------------------|-------------|-----------------------------------------------------------------------|----------------------|----------------------|----------------|--------------------------------------------------------------------------------------------------------------------------|
| 1851.<br>20th Oct. | Ararat.....                       | 16.28                    | 86.58       | Strong breezes and squalls, from West and South, increasing fast.     | 29.75<br>2 P.M. 67.  | ..                   | 84             | Barometer on the 19th 29.85. Rearward sea of the Cyclones at Noon from the N. W. 1.30 P. M. hove to, midnight hard gale. |
|                    | Easurain.....                     | 15.25                    | 91.56       | P. M. moderate S. E. breeze and fine, moderate                        | 29.15<br>29.30       | ..                   | ..             | Heavy S. W. swell.                                                                                                       |
|                    | Georgina.....                     | 21.4                     | 88.40       | 8 A. M. Threatening to the S. E., Noon moderate, P. M. light squalls. | 29.92<br>29.89       | 29.55<br>to<br>29.40 | 87<br>to<br>89 | At anchor, and standing to Sea from the Sand Heads. Bank to S. E. with lightning.                                        |
|                    | Schr. Orissa, Balasore River..... | 21.28                    | 87.12       | Cloudy. Wind S. E.                                                    | 29.66<br>falling.    | ..                   | ..             | Ran in to Balasore River for shelter.                                                                                    |
|                    | Lucknow; standing to sea .....    | 20.40                    | 87.54       | A. M. E. S. E. P. M. East, 10 P. M. N. E. increasing breeze.          | ..                   | ..                   | ..             | Standing to the S. S. W. and South.                                                                                      |
|                    | H. C. P. V. Tavoy.                | Eastern Channel.<br>20.4 | 88.27       | E. S. E. Increasing breezes with heavy squalls and rain.              | 29.96<br>to<br>29.87 | 79½<br>to<br>81      | ..             | Sea beginning to rise.                                                                                                   |

| Date.     | Name of Ship or Station.         | Lat. N. | Long. East. | Winds and Weather.                                                                                          | Bar.                                 | Symp.                                                        | Ther.      | Remarks.                                                                                                                                                                                  |
|-----------|----------------------------------|---------|-------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21st Oct. | Ararat.....                      | 17.6    | 87.50       | South at 5 A. M. S. S. W. again at Noon. P. M. S. S. W. to midnight when hard gale and squalls about South. | 29.70                                | ..                                                           | 84         | Ship running 8 to 10 knots to the North breaking up at 4 A. M.                                                                                                                            |
|           | Easurain.....                    | 17.4    | 90.33       | Wind S. E. 7 and 8 knot breeze, P. M. South.                                                                | ..                                   | Bar.<br>29.93<br>5 P. M. 95.<br>6h. 88<br>8h. 90<br>Mid. 88. | 86         | Very heavy S. W. swell. P. M. dangerous. cross sea W. N. W. to S. W.                                                                                                                      |
|           | Lord Petre.....                  | 19.20   | 89.54       | S. W. and S. b. E. A. M. squally; midnight strong gales.                                                    | A. M. 29.86<br>P. M. .90<br>Mid. .86 | ..                                                           | 78. to 77. | 4 P. M. hove to, dark squally weather.                                                                                                                                                    |
|           | Georgina.....                    | 21.60   | 88.30       | E. S. E. and S. E. b. E. breeze increasing throughout.                                                      | 29.84<br>to<br>29.56                 | 29.35<br>to<br>29.15                                         | 89         | Barometer very unsteady, 10 A. M. suspicious to the Eastward and Southward. Standing to the S. W., clear over head, wild looking weather, heavy head sea from S. E. and S. W.; lightning. |
|           | FALSE POINT LIGHT HOUSE..        | 20.19½  | 86.59       | Winds N. N. E., East and N. E. cloudy, light rain, heavy squalls increased to a strong gale.                | ..                                   | 29.85<br>to<br>29.50                                         | ..         | Hazy; appearance of a gale. Scuds from N. E. and S. East crossing.                                                                                                                        |
|           | Schooner Orissa, Balasore River. | 21.28   | 87.12       | Wind E. S. E. squally                                                                                       | 29.60                                | ..                                                           | ..         | No indications of a storm, but tide 2 hours in advance.                                                                                                                                   |

| 21st Oct. Brig Scourfield<br>Pilot Station. .. | ..                                    | ..    | Fresh S. Easterly<br>breeze and squally.                                                                                                                       | ..                                    | .. | ..                | Heavy swell from the<br>Southward at night.                                                                                              |
|------------------------------------------------|---------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----|-------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Lucknow.....                                   | 19.9                                  | 87.43 | 2 A. M. strong gales<br>N. E. increasing to<br>Noon. P. M. wind had<br>veered to N. W. at 8<br>P. M. S. W. Midnight<br>stiff gales.                            | ..                                    | .. | ..                | 2 A. M. heavy sea from the<br>Southward; 10 A. M. hove to,<br>running to the S. and S. b. W.<br>till that time, 6 P. M. modera-<br>ting. |
| H. C. P. V. Cavery                             | Proceeding<br>down and to<br>Sea.     |       | E. b. S. to S. E. b. S.<br>11 A. M. S. E. b. S.<br>Midnight E. S. E.                                                                                           | 29.99<br>to<br>29.95                  | .. | ..                | Lightning N. E. to N. W.<br>at 8 P. M.                                                                                                   |
| H. C. P. V. Tavoy.                             | Eastern<br>Channel.<br>21.4           | 88.27 | Blowing hard E. S. E.<br>to S. E. gusty and un-<br>steady and at times S.<br>S. E.                                                                             | 29.84<br>to<br>29.80                  | .. | 81<br>to<br>81.30 | Atmosphere dark and<br>gloomy. Signs of warm wea-<br>ther.                                                                               |
| H. C. F. L. V. Hope                            | Saugor<br>Point.<br>Station.<br>21.26 | ..    | A. M. moderate N. E.,<br>and increasing. Noon<br>East; 4 P. M. strong<br>S. S. E. winds 8 P. M.<br>blowing hard S. E. b. S.<br>Midnight heavy gale<br>S. S. E. | 29.82½<br>to<br>29.80<br>and<br>29.75 | .. | 81<br>to<br>80    | 8 P. M. heavy squalls<br>thunder, lightning and rain.                                                                                    |
| Virginie.....                                  | Saugor<br>Roads.                      | ..    | Fresh breeze E. b. N.<br>to E. S. E.                                                                                                                           | 29.75 to<br>29.66                     | .. | ..                | At Anchor.                                                                                                                               |
| H. C. B. V. Grap-<br>pler.....                 | Kedgerec.<br>21.52                    | 87.59 | N. E. to East with<br>squalls and rain. Latter<br>part East to S. E. hard<br>squalls.                                                                          | 29.88<br>to<br>29.85                  | .. | ..                | .....                                                                                                                                    |



| Date.     | Name of Ship or Station.       | Lat. N.             | Long. East. | Winds and Weather.                                                                                                       | Bar.                                  | Symp.                      | Ther.          | Remarks.                                                                                                                                             |
|-----------|--------------------------------|---------------------|-------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21st Oct. | H. C. Surveying<br>Brig Megua. | Mud Point.<br>21.56 | 88.07       | N. East and Easterly.                                                                                                    | 30.03<br>to<br>30.02                  | ..                         | ..             | Gloomy and threatening<br>from the Eastward with pass-<br>ing squalls.                                                                               |
|           | At CALCUTTA....                | 22.35               | 88.21       | Wind in light squalls<br>and puffs N. to N. E.                                                                           | ..                                    | ..                         | ..             | Scud from East and N. E.                                                                                                                             |
| 22d Oct.  | Ararat.....                    | 19.18               | 88.2        | Southat 10 A. M., in-<br>creasing. Noon hard<br>gale; P. M. S. W. b. S.<br>hard gale, to midnight.                       | 29.66                                 | ..                         | 87             | Running up till daylight<br>when hove to again. Dense<br>black bank to the Westward.                                                                 |
|           | Easurain.....                  | 19.38               | 89.55       | Strong gales South; 4 A. M. 29.89<br>P. M. S. S. W. mid-6 .86<br>night hard gales S. S. W. 8 .90<br>Noon .88<br>Mid. .85 | 29.89<br>.86<br>.90<br>.88<br>.85     | ..                         | 86             | Cross sea threatening to<br>W. S. W. Current to S. E.<br>b. E. 16'. 4 P. M. hove to.<br>Tremendous sea, S. W. to<br>West.                            |
|           | Lord Petre.....                | 20.02               | 89.20       | Wind S. b E. to S.<br>b. W. throughout; to 8<br>A. M. strong gales. Noon<br>more moderate, P. M.<br>Strong gales.        | { 29.78<br>A.M. {<br>P. M. .80<br>.70 | ..                         | ..             | Squalls and much light-<br>ning.                                                                                                                     |
|           | Georgina.....                  | ..                  | ..          | 4 A. M. very severe<br>gale S. S. E. Noon S.<br>W. b. S. P. M. S. W. b.<br>S. midnight S. W.                             | 29.53<br>to .48<br>and .69            | 29.10<br>to .04<br>and .25 | 86<br>to<br>84 | 10 A. M. severe squall, ship<br>on her beam ends; wind veered<br>to S. W. Noon in 35 fs. wa-<br>ter. Midnight violent squalls<br>and tremendous sea. |

|                                                                             |        |       |                                                                                                                                                         |                                             |            |    |                                                                                                                                                |
|-----------------------------------------------------------------------------|--------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------|----|------------------------------------------------------------------------------------------------------------------------------------------------|
| 22 Oct. False Point Light House.....                                        | 20.19½ | 86.59 | 2 A. M. E. N. E. 4 East 5 S. E. 7.30 stark calm and heavy rain; 9.30 complete hurricane at South; Noon S. W. 3 P. M. West.                              | 29.45 to 28.50 and 29.70                    | ..         | .. | 2.30 A. M. sea made a complete breach up to the light house, 3 P. M. gale broke.                                                               |
| Schooner Orissa, Balasore River.                                            | 21.28  | 87.12 | Wind East and E. N. E. 3 P. M. E. N. E. to N. E. 6 N. E. to N. N. E. 9 P. M. N. W. to West.                                                             | 29.50 P. M. 29.55 3 29.45 4 .40 5 .20 1 .10 | ..         | .. | Gale from 4 P. M. to 3 A. M. 23rd.                                                                                                             |
| Scourfield; Pilot Station and at sea.                                       | ..     | ..    | Blowing hard from S. East with roaring gusts daylight hard gale, midnight moderate.                                                                     | 29.70 to 29.60 and .50                      | ..         | .. | Daylight put to sea 4 P. M. on her beam ends, cut away masts and anchored.                                                                     |
| Lucknow.....                                                                | 17.44  | 87.30 | A. M. stiff gale S. W.                                                                                                                                  | ..                                          | ..         | .. | .....                                                                                                                                          |
| H. C. P. V. Cavery. In 20 fs. to S. W. of station and at anchor about 20.44 | ..     | ..    | E. S. E.; 2.30, oscillating from E. S. E. to S. E. till 2 P. M. when veered to S. S. W. 8 P. M. wind hauling to Westward, midnight moderate at W. S. W. | 29.69 to 29.30 and 29.80                    | ..         | .. | Heavy hurricane, E. S. E. to S. S. W. 4 P. M. Bar. began to rise.                                                                              |
| H. C. P. V. Tavoy. Eastern 21.4                                             | ..     | ..    | Increasing gale. Noon a heavy gale; P. M. severe E. S. E. to South, Noon to 8 P. M. when S. S. W. to midnight.                                          | 29.76 to 29.53 and 29.55                    | 81. to 80. | .. | Very high sea from S. E. Noon breaking dangerously, P. M. tremendous cross sea, rain in sheets. Extraordinary flashes of light S. E. and N. E. |

| Date.    | Name of Ship or Station.      | Lat. N.               | Long. East. | Winds and Weather.                                                                                                                    | Bar.           | Symp.    | Ther. | Remarks.                                                             |
|----------|-------------------------------|-----------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|-------|----------------------------------------------------------------------|
| 22d Oct. | H. C. F. L. V. Hope. ....     | Saugor Point Station. | ..          | Strong S. S. E. gales to Noon; increasing to hurricane at sunset. 8 P. M. S. S. E., midnight the same. Hurricane.                     | 29.83 to 29.10 | 80 to 75 | ..    | Heavy squalls and sea throughout.                                    |
|          | Virginie.....                 | Saugor Roads.         | ..          | S. E. to S. E. b. E.                                                                                                                  | 29.68 to 29.30 | ..       | ..    | Sunset heavy banks to South 11 P. M. hurricane 11.40 cut away masts. |
|          | P. and O. Str. Precursor..... | Kedgeroe. 21.52       | .. 87.59    | 9.45 wind E. S. E. heavy rain and thick windy weather. Noon E. S. E. to S. E. 4 P. M. E. S. E., midnight S. E. to S. S. E. hard gale. | 29.90 to 29.28 | 80 to 78 | ..    | From 8 P. M. to midnight, gale increasing fast.                      |
|          | H. C. B. V. Grappler.....     | Kedgeroe.             | ..          | A. M. hard squalls from Eastward to 7 A. M., squalls and thick rain E. N. E. to S. E. To midnight, severe gales.                      | 29.85 to 29.83 | ..       | ..    | Hard squalls of dense thick rain.                                    |
|          | H. C. Surv. Brig. Megna.....  | Mud Point. 21.56      | .. 88.07    | East to Noon then N. E., E. N. E. and S. S. E. and at 10 P. M. E. S. E. to East, hurricane.                                           | 29.92 to 29.72 | ..       | ..    | Weather increasing gradually to hurricane; gale commenced at 6 P. M. |

| 22d Oct. | H. M. S. Fox....                | Diamond Harbour.                     | Wind Easterly (3.)<br>P. M. the same (6.)<br>8 P. M. East (9.) Mid-<br>night East (10.)                   | 29.80<br>29.71<br>and<br>29.56                    | ..                                   | 79. | Gloomy squally weather<br>throughout with thunder and<br>lightning at 8 P. M.                                  |
|----------|---------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------|-----|----------------------------------------------------------------------------------------------------------------|
|          | At CALCUTTA....                 | ..                                   | 6 A. M. light squalls<br>and puffs N. to N. N. E.<br>and N. N. W. 8 P. M.<br>squally breeze from N.<br>E. | 29.86<br>to<br>29.96<br>and<br>29.82              | 29.95<br>to<br>30.00<br>and<br>29.91 | 79. | Scud thick and frequent,<br>and a low smoky scud below<br>all from N. E.                                       |
| 23d Oct. | Ararat.....                     | 19.30                                | 9 A. M. S. S. W.<br>Noon hard gale; 3 P. M.<br>W. S. W. b. W. 6 P. M.<br>W. S. W. moderating.             | 29.68                                             | ..                                   | 86. | .....                                                                                                          |
|          | Easurain.....                   | 20.11                                | Daylight hard gale S. S. W.<br>to S. S. W. the same<br>throughout.                                        | 4 A. M. 29.84<br>Noon .85<br>2 P. M. .80<br>6 .76 | ..                                   | 84. | Lying to. Sunset, remark-<br>able red sky to Westward.                                                         |
|          | Lord Petre.....                 | 20.29                                | Wind S. b. W. to W.<br>S. W. 6 A. M. Hurri-<br>cane till 9 A. M. Noon<br>fresh gale.                      | { 29.70<br>.74<br>to .78                          | ..                                   | ..  | Midnight dark squally ap-<br>pearance to the S. W. with<br>much lightning.                                     |
|          | Georgina.....                   | 25 miles S.<br>of Floating<br>light. | A. M. gale appears<br>broken, wind S. W.,<br>Noon moderate.                                               | 29.68<br>to<br>29.81                              | ..                                   | ..  | 8 P. M. lighting to the<br>westward, midnight squalls,<br>rain and thunder and light-<br>ning to the eastward. |
|          | FALSE POINT Light<br>House..... | 20.19½                               | Wind West and fine<br>weather,                                                                            | 29.70<br>to<br>29.72                              | ..                                   | ..  | .....                                                                                                          |



| Date.    | Name of Ship or Station.                    | Lat. N.                  | Long. East. | Winds and Weather.                                                                                                                                                                | Bar.                     | Symp. | Ther.      | Remarks.                                                                                          |
|----------|---------------------------------------------|--------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------|------------|---------------------------------------------------------------------------------------------------|
| 23d Oct. | H. C. P. V. Cavery                          | 20.44                    | 87.20       | Variable West to N. N. W.                                                                                                                                                         | 29.90                    | ..    | ..         | Towards morning much lightning to the S. W.                                                       |
|          | H. C. P. V. Tavoy.                          | Eastern Channel.<br>21.4 | 88.27       | To 4 A. M. severe gale and S. W. wind to 8 A. M. when W. S. W.; at 10. West at Noon; W. N. W. at 2, and N. W. at 8 P. M.                                                          | ..                       | ..    | ..         | Severest part of gale from 4 P. M. 22nd to 4 A. M. 23rd                                           |
|          | H. C. F. L. V. Hope .....                   | Saugor Point Station.    |             | A. M. hurricane S. S. E. 8 A. M. hurricane shifted to the Westward with terrific squalls.                                                                                         | 29.10 to 28.33           | ..    | ..         | 1 A. M. Vessel on her beam ends and driving 8 P. M., grounded.                                    |
|          | Virginie.....                               | Saugor Roads.            |             | 1 A. M. South, 2 S. S. W; 3 West; 6 W. N. W.; 7 N. W. Noon North 2 N. b. E.; 5 N. N. E.; 8 East. 9 S. East to daylight. Hurricane but steady, 6. A. M. moderating to severe gale. | 29.14 to 28.65 and 29.57 | ..    | ..         | Midnight wind terrific. Nearly foundering; daylight bright glaring patches in sky.                |
|          | P. and O. S. N. Comp's Str. Precursor. .... | Kedgerree.               | ..          | Wind steady at S. S. E. to 4.30 A. M. when lulled; at 5, shift from N. N. E. to N. West.                                                                                          | 28.83 to 29.91           | ..    | 78. to 82. | 2 A. M. terrific hurricane; 4 A. M. grounded, 9 A. M. wind lulled and continued moderate at N. W. |



## SUMMARY.

I proceed now to detail the grounds on which I have delineated the remarkable track of this very interesting Cyclone, which is distinctly an instance of the recurving of a track at the head of the Bay, and to shew its rate of travelling and other peculiarities.

The *Ararat's* Log is the first to consider, and we find her running up towards the Sand Heads on the 18th and to Noon of the 19th with a smart monsoon breeze and latterly sharp squalls, being at Noon in Lat.  $13^{\circ} 50'$  N.; Long. A. M.  $87^{\circ} 11'$  East; Bar. at 29.81; Ther.  $84^{\circ}$  this weather increased to midnight; the wind however still at S. b. W.

*On the 20th of Oct.*—The squalls are stated to come from “about West;” at 3 A. M., though the wind is marked S. b. W. and South; at 11 A. M. and at 10.30, the squalls are said to be S. W. veering to S. b. W. At Noon she was in Lat. by Acct.  $16^{\circ} 28'$  N.; Long.  $86^{\circ} 58'$  East; her Bar. having fallen a little, and this with the heavy appearance and a very heavy sea from the W. N. W. induced Capt. Ritchie, very properly, to heave to at 1 P. M. When hove to in Lat.  $16^{\circ} 35'$  N. Long.  $86^{\circ} 58'$  E. he had the wind S. S. W. and the Barometer still falling, being at 29.67 at 2 P. M. Unfortunately the continuous observations of the Barometer, though it was evidently carefully watched, are not registered. At midnight on this day it was blowing a hard gale with torrents of rain. The *Easurain* four degrees to the Eastward of the *Ararat* had nothing but a heavy swell, and the *Georgina* and *Tavoy* at the Pilot station, or  $4\frac{1}{2}$  degrees to the North of the *Ararat*, had increasing breezes from the E. S. E. and the sea beginning to rise. The *Lucknow* which ship had just left her Pilot, and was some twenty miles to the South of the station, had also the sea beginning to rise with the wind at N. East.

From these data, we should at first say that, if the Cyclone was at all in action on this day, its centre would be somewhere between the position of the *Ararat* and Vizagapatam; but from her subsequent run and her Barometer on the 21st, together with the winds experienced by the other ships, there was nothing at the earth's

surface on this day beyond a strong remnant of the monsoon. I say here "at the earth's surface" because I think it quite probable that the Cyclone may have been formed and in action overhead, and not far from the *Ararat's* position, though it had not yet descended.

*On the 21st Oct.*—We have the *Ararat* bearing up at 5 A. M. with the wind at South, and running up to the N. N. W. with a fine breeze at Noon, when she again had it S. S. W. and by sunset it increased to hard squalls; at midnight it was a hard gale with which she was running 10 knots, being then at midnight in  $18^{\circ} 35'$  N. and Long.  $87^{\circ} 23'$  East with the wind about S. b. W. veering to South at 3 A. M. on the 22nd. We have also for this day the *Lucknow's* log, which ship on the 21st, at noon had a heavy gale which had veered from N. E. to W. N. W. as she ran down and hove to, showing that she was on the Western side of her Cyclone, while the *Lord Petre* in nearly the same latitude but 130 miles to the Eastward of her, was hove to with a heavy Southerly gale showing that she was on the Eastern side of it. To the Northward, the *Georgina* just leaving her pilot, found the weather becoming worse, with more suspicious appearances as she stood to the S. W., her Barometer being unsteady and the sea coming up from the S. East. The Pilot vessel *Tavoy* and the ship *Scourfield*, at the pilot station had it blowing fresh, and with the *Tavoy* hard, from E. S. E. to S. East, though the *Tavoy's* Barometer was yet 29.84 to 29.80.

From this it appears clear that there were *two* Cyclones formed on the 21st, both travelling up on tracks between North and N. N. W. the Western one of which passed over the Light House at False Point; at 8 A. M. on the 22nd, being at Noon on the 21st between the *Ararat* and the shore; its centre lying then in about Lat.  $17^{\circ} 30'$  N. and nearly on the meridian of the Light House at 176 miles distant from it, and this Cyclone we may, to distinguish it, call the Light House Cyclone. The other, or Eastern one, I consider to have its centre between the tracks of the *Lucknow* and the *Lord Petre* or between the meridians of  $88^{\circ}$  and  $90^{\circ}$ , its centre being at Noon, also on the 21st, in about  $19^{\circ} 12'$  North and, say, 118 miles S. S. E. of the Floating Light Vessel station. The heavy Southerly gales of the *Ararat* may, it is true, have been, for a time at least, the remainder of the monsoon, but there seems no reason to doubt that, if not



from the first forming the Eastern quadrants of a Cyclone, they finally were so, beyond question. There is nothing extraordinary in this instance of Cyclones occurring about the same time, and traveling up on parallel tracks,\* as those who have paid attention to the progress of Cyclonology well know.

*On the 22nd of Oct.*—Following, first, the Light House Cyclone: We find the *Ararat's* Southerly gale still continuing and increasing so much that at daylight, she very properly hove to again. She notes at this time, and this is of much interest “a dense black bank to the Westward” and this, I consider to have been indubitably the body of this Cyclone. At noon she was in Lat.  $19^{\circ} 16' N.$ ; Long.  $88^{\circ} 2' East$  or 88 miles S. East of False Point Light House, where the centre, preceded by the storm wave at 2h. 30' A. M. wind then E. N. E. had already passed from 7h. 30' to 9h. 30' or say 8 A. M. and the gale from E. N. E. had shifted and veered to S. W. At Noon we find the *Ararat* had the wind at South, according to her log, in which it is only entered at 3 A. M. but as she was, while lying to, coming up to S. E. it is clear the wind was at least S. W. b. S. at times with her. She had hove to at 8 A. M. and if we take her drift to have been three miles per hour to the Northward, this will place her at 8 A. M. in about Lat.  $19^{\circ} 06' N.$  and the Long. as before  $88^{\circ} 02' East$ , with the Light House bearing N.  $43^{\circ} West$ .

And we must take this position and the Light House report, on which the fullest dependence can be placed, to fix the centre of this Cyclone there for this day, and a circle with its centre at the Light House as at 8 A. M. instead of at Noon, and the Cyclone circles extending to the position of the *Lord Petre* and *Lucknow* nearly agrees with their winds, allowing for some little incurving, so that at this time the two Cyclones of the 21st had united? from which we may deduce that the Eastern one was travelling over to the Westward, and that it was probably at their junction that the American ship *Portsmouth* was dismasted. The log of this ship will be found in the summary.

We farther find that from 8 A. M. to Noon 'this day, the Cyclone at the Light House had recommenced blowing “a complete hurri-

\* See for a remarkable instance of them in this very locality and also in the month of October, the Ninth Memoir, Journ. As. Soc. Vol. XII. p. 771.

cane" at South, and that at Noon it was S. W. and began to break at 3 P. M. with the wind at West.

Now if we trace this track, i. e. wind East at 3 A. M. and S. E. at 5, calm at 7.30 to 9.30 or say the centre passing at 8 A. M., then renewing at South at 10 and becoming S. W. at Noon as just described we shall find that with proper allowances for its probable distance as shewn by the Barometer, this gives a track curving to the N. N. East, the actual centre of the calm space being inland, a few miles West of the Light House at 10 A. M. I need not say that the fullest confidence is to be accorded to Mr. Barckley's careful observations.

At Noon we have the gale commencing only at E. N. E. with the H. C. Schooner *Orissa* in Balasore Roads, where we have also fortunately in Mr. Bond, the Master Attendant, another excellent observer. It passed up to the Eastward of that station, veering gradually to the N. E. and becoming "a gale;" at 4 P. M. We should have expected it to have begun earlier here, and I can only account for this anomaly by the fact that the Northern and North Western quadrants of the Cyclone, when the centre reached False Point, extended to the range of high hills (from 2000 to 2500 feet high) called the Balasore Nilgherries, which form one of the Eastern extremities of the great Vindhya chain. These lie inland about 25 miles from that station, and may have occasioned the Cyclone to lift up in that quarter for a time, and indeed to have turned off to the North East, as we see it has done. At the Pilot station it was now a heavy gale at South, and these winds will place the centre in Balasore Roads in about Lat.  $21^{\circ} 05'$ ; Long.  $87^{\circ} 40'$  East. We have, it is true, also the logs of the *Georgina* and *Cavery*, but as these vessels were drifting with the hurricane and their positions uncertain, and both in distress; the *Georgina* indeed at some distance to the S. East in 35 fathoms water, I have not used them.\*

*October 23rd.*—The next positions we have for the centre are from the log of the P. and O. Steam Vessel *Precursor* and the H. C. Buoy Vessel *Grappler* at Kedgerree; where it fell calm at 4h. 30'

\* The *Cavery* was found after the gale to be at an anchor in 9 fs. off the Reef of Point Palmiras, but even the time on board of this vessel was not well ascertained in her distressed condition, as I afterwards learned.

A. M. with the first vessel, which was\* then on shore close to Cowcolly light, and at 6 A. M. moderated and veered to the Northward with the *Grappler*, which vessel appears to have been at some little distance from the *Precursor*, but not far enough to account for this discrepancy, which we must therefore attribute to those errors in the estimates of the time usually made when the log is written up from recollection as it always is in these cases I suppose ? unless on board of Men-of-war, or where there is a scientific officer on board who is carefully observing while others are carrying on the ship's duties as in the case of the *Megna* Surveying Vessel with Mr. B. Pilot Bedford, the River Surveyor, whose log and register at Mud Point we shall presently quote.

To come back to Kedgerree then :

|                                                                                                                   |                | And gale<br>recom-<br>menced at |
|-------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------|
| The <i>Precursor</i> log says, it fell calm at, . . . . .                                                         | 4h. 30'        | 5h. 0'                          |
| The log of the Pilot on board the <i>Precursor</i><br>says, it fell calm at, . . . . .                            | 5h. 00'        | 5h. 30'                         |
| <i>Grappler's</i> log says, moderating at 6h., and <i>veering</i><br>about the same time or say 6h. 10, . . . . . | 6h. 00'        | 6h. 10'                         |
|                                                                                                                   | <hr/> 15h. 30' | <hr/> 16h. 40'                  |

The mean of these for the station of Kedgerree

will be, . . . . . 5h. 10' 5h. 33

Or that the centre passed there about 5.20 A. M. of the 23rd Oct.

We then find the next certain position near to the centre to be that of the H. C. S. *Megna* off Mud Point at 7 A. M. when "it moderated for a short time and shifted to North" having previously blown at E. S. E. ; but it seems by Mr. Bedford's table to have veered shortly after to N. N. E. and thus to have been for three or four hours before the shift at E. S. E., and for two hours after it at N. N. E. which we must take therefore, to indicate pretty nearly the track of the main body of the Cyclone. This would give us a track to the N. East for that of the Cyclone from Kedgerree. And as we shall subsequently shew the calm space itself was hereabouts of very small extent, so that we may take this to be not far from the truth.



From this station, the track to the N. East carries us into the wilds of the Sunderbunds, whence no reports can be obtained, and we cannot consider the Noacolly and Chittagong Cyclone to be any part of this at Kedgerree, as its track, was evidently from South to North, and it commenced within 12 hours of the passage of the centre at Mud Point. The veering of the wind with H. M. S. *Fox* at Diamond Harbour, I need not remark, is exactly that of a Cyclone passing up on a N. E. track to the South-East and East of the Vessel, her Barometer being lowest (29.375) with the wind North, shewing that the centre was nearest to her when bearing East.

RATE OF TRAVELLING.—We have, from the foregoing documents, a tolerably exact knowledge of the time which the Cyclone centre took to travel from a position a few miles West (inland) from the Light House on False Point; on perhaps a somewhat curving track up to Kedgerree, which was from 8 A. M. on the 22nd to 5h. 20' A. M. on the 23rd, or 21h. 20' of time. Now the distance on a straight line between these points is 115 miles\* which gives a rate of 5.4 (five miles, four-tenths) per hour for that of the Cyclone's travelling on this part of its course; and we find moreover that passing Kedgerree at 5h. 20' A. M. it moderated for a short interval at 7 A. M. with Mr. Bedford at Mud Point, and at 8, there was a sudden shift when it blew as hard as ever; so that taking the centre to have passed thus at 7h. 30' A. M. this gives about an interval of two hours for it to traverse from Kedgerree Light House to Mud Point, a distance of 11 miles or 5.5 miles per hour, the former rate being 5.4.

We have thus very fairly the rate of travelling for the 22nd,—23rd, and if we were to assume that on the 21st, 22nd, it was travelling at the same rate, we should only have to measure back 132 miles to find the place of the centre of the *Ararat's* Cyclone for the 21st; but this distance so measured would only place the centre far enough to the South, to give the *Ararat* a S. W. wind, whereas we see by her log she had it still at about South or at most S. b. W. so that our former estimation of the place of the centre as being at about 175 miles South of False Point is probably the correct one. This distance would give

\* 113 miles from Light House to Light House, but 2 miles more are allowed for the centre being to the Westward of Kedgerree.



it a rate of travelling of 7.3 per hour on the 21st and 22nd, so that its progress was, as usual, somewhat retarded by the land.

THE DIAMETER OF THE CALM CENTRE.—This is always an element of much interest where we can obtain any approximation to it. And in this Cyclone we have a very good one, for we have seen above that the rate of travelling between False Point and Kedgerree Light Houses was 5.4 per hour, and we learn from Mr. Barckley's capital report that it fell "stark calm" at 7h. 30', and that it was blowing a complete hurricane at 9h. 30' A. M. of the 22nd; and as the actual centre passed somewhat to the Westward of the Light House p. 543 we may take 2 hours at 5.4, or ten miles eight-tenths, or say in round numbers eleven miles as the diameter of the centre there on that day; but on the 23rd at Kedgerree, it seems to have much diminished as the calm interval there was not more than half an hour, which would give but  $2\frac{3}{4}$  miles for the diameter of the centre; and with the *Megna* off Mud Point, at the N. West extremity of Saugor Island, though the centre must have passed very close to the S. East of her (shift from E. S. E. to N. N. E.) it moderated only for a very short interval. With the *Hope*, Light Vessel off the S. W. part of Saugor Island, no calm occurred. The American ship *Sturgis* in Saugor Roads while the centre was passing her, had the wind veering from E. N. E. to South and a slight lull "for a few moments," is afterwards noticed at 6 A. M. but this was no part of the centre, and it is evident that on this day, there was no extensive calm space at the centre.

#### THE PORTSMOUTH'S LOG AND PROTEST.

I obtained through the attention of Chas. Hufnagle, Esq. American Consul at Calcutta, a copy of the Protest and an extract from the Log of the American Ship *Portsmouth* of New York; but there are unfortunately so many discrepancies between them, and again between these and the newspaper report, that as regards the ship's exact position, and even the dates, I am wholly unable to reconcile them without the most arbitrary and unwarrantable changes, and unfortunately again, I could not obtain a sight or copy of the ship's detailed log, nor a comparison for her Barometer, so that for tracking the Cyclone, they are quite useless.

But there are some details of great interest in these papers which appear to me to indicate that this ship may possibly have been caught at the junction of the two Cyclones! or at least to have experienced one or more tornados (and this is the word too used in the log and protest) at or near to the centre of the Cyclone into which she ran. In the following brief summary which is compiled from both the log and the protest, the expressions between commas are those of the documents themselves.

The *Portsmouth* appears to have run up with strong gales from the S. W. and S. S. W. which veered to S. East when she hove to, and soon had it "blowing a perfect hurricane" which blew away her close-reefed main topsail, and sails from the gaskets, and reduced her to bare poles, wind still at S. East, ballast shifting from the ship lying on her beam ends.

"At 3 P. M. it fell nearly calm with a light breeze from south; Barometer suddenly fell from 29.40 to 28.30! Deck covered with snipes, butterflies, locusts and grasshoppers, water discoloured, ship drifting towards the land; 5 P. M. tornado struck the ship from the southward; bent the cables; 7, ship on her beam ends with her ballast shifted, and expected she would go over, cut away main and mizen masts and lost foretopmast. At 10, moderate wind at S. S. W. but Barometer still at 28.30; midnight a third tornado struck the ship from S. S. W. more severe than before. The wind now *burst up*\* both main and after hatches, and the dead-lights from the cabin, windows," says the Protest. The log extract says, "Hatches bursting off in spite of bars and spikes, Round-house blown all to pieces and dead-lights from the stern windows." Protest again says, "The carved work was blown from the stern, the Round-house on deck blown to pieces, and no man could stand on deck without holding on." 2 A. M. Barometer rising; 6 A. M. gale abated.

From this detail, there appears clearly to have been separate centres, or local tornados, formed at the edges or by the interference of the two Cyclones? for the first calm and extraordinary fall of the Barometers occurs at 3 P. M.; then at an interval of two hours, or 5 P. M. a tornado (used hereto express the violent burst of a furious gale)

\* So in the originals, but I had no opportunity, I regret to say, of making inquiries as the ship had left Calcutta, when the documents reached me.

“strikes” the ship ; then it moderates at 10 p. m. but the Barometer is still depressed, and at midnight a third tornado “strikes” the ship!

Now, if these singular (we may almost say wonderful) phenomena occurred all within a brief period, say of an hour or even two, we might account for them by supposing the centre for a time stationary, and that the ship was drifted back into the calm vortex a second time, or carried on into it in some way, or that it had in some way vibrated or revolved, as Mr. Redfield supposes the centre may do to a certain extent, so as to reach the helpless ship again. But an interval of *nine hours*, that is, from 3 p. m. to midnight seems to put this out of the question ; for the Cyclone, if single, must have curved forward some distance ; though it may possibly have been carrying the ship with it, as in the case of the *Briton* and *Runnimede* which were whirled round and round and carried forwards for hours before they were thrown on shore (see Journ. Vol. XIV. p. 357 Twelfth Memoir) but then in that case the wind would have veered or shifted somewhat, which it did not do with the *Portsmouth*. The *Briton* had, like the *Portsmouth*, two lulls and three onsets of the hurricane, but then the wind was veering all round the compass, and the *Runnimede* close to her had but one lull ; and the fact of the *Portsmouth's* Barometer having remained stationary seems conclusive, not only as to there having been double Cyclones following each other, but moreover that, as we have nearly demonstrated in the case of the *Eliza* (9th Memoir as before quoted p. 542) this continued depression of the Barometer is what really occurs in such cases, and on this account alone the record of the fact, whenever and wheresoever it happened, is most important.

The “bursting up” of the hatches is so loosely described, that we are at some loss how to consider it. It might be a bursting up of the hatches by the force of the wind getting below, which though difficult to conceive in a ship in such weather, would be analogous to what takes place in the great West India Hurricanes, where, when a door or window is burst open the other windows are *blown out*, and even the roofs blown off if another window on the opposite side is not opened to allow the exit of the air forced in by the hurricane. Or it might be the hatches getting loose by the working of the deck combing, and so falling in ; though this would not be “bursting up” or it



might be *partly* the force of the wind below, (though as I have before remarked, this is very incredible and improbable,) and *partly* some uplifting power in the peculiar electric state of the atmosphere at the time, analogous to the attractions and repulsions of light bodies between oppositely electrified conductors.\*

*The set to the Westward over the Sand Heads.*—This most dangerous set, it will be seen, was fully experienced in this Cyclone, and it is so fraught with danger to the mariner that his attention cannot be too closely directed to it. It becomes in fact at the approach of a Cyclone, a complete Gulf Stream! a term which every Atlantic sailor perfectly understands. It is also, and this often as early as the Barometer, and before the appearances of the sky and clouds are at all remarkable, an almost infallible sign of the approach or distant passage of a Cyclone!

### CONCLUSION.

I have had somewhere to say that almost every successive memoir brings some new fact of importance to light, to reward us as it were for our labour, in carefully collecting and following out the details. And this, the TWENTY-THIRD of the series is no exception to the rule; for it discloses to us, not only a new track of which, though suspected, we had as yet no instance, but it also offers us another proof that here as in the China sea, the law of curving, or recurving, about the latitude of the tropics at times holds good. Upon what this depends, we are at present totally ignorant, and it is probably some effect of those great laws of atmospheric agency by which Cyclones are generated. For the present our task is to collect and register, and to sum up our preliminary results, which never fail, as we see, of affording us some practical advantage, and thus we may hope that we are doubly advancing the cause of science by eliminating that which is of present utility and by aiding in the research for general laws when sufficient facts shall be collected to deduce them.

\* See Horn Book of Storms, 2nd edition, pp. 268 and 270 for instances of this electrical effect in water-spouts, as also the log of the Brig *Freak*, Journ. As. So. Vol. IX. page 1014. Third Memoir; where the vessel's foremast is torn out of her, carried up aloft, and falls down again on the deck!



*Some Remarks on the Origin of the Afghán people and dialect and on the connexion of the Pushto language with the Zend and Pehlavi and the Hebrew.—By* LIEUT. H. G. RAVERTY, 3rd Regt. Bombay N. I. Asst. Commissioner, Múltán.

In all investigations into the manners and customs of mankind, which must ever be an interesting enquiry, language has a strong claim to our attention and study. It will be found, in various ways, such an unerring guide, that we may term it the barometer of a people's civilization or barbarity; whilst on the other hand the derivation and affinity of different tongues, afford an indisputable proof of the origin and genealogy of the various families of the human race. It also adds a physical certainty to historical evidence, and at the same time, no authority can so indubitably determine the peculiar habits and pursuits of a people, as the manner in which their thoughts and ideas are articulated and expressed; for want of copiousness, or poverty of a language, as it may be termed, generally indicates an uncivilized state—ignorance, and superstition.

By oral means alone can a dialect be formed or extended, but its subsequent cultivation must depend on writing and literature; and knowledge, on which civilization, and refinement—in fact, on which every thing that tends to raise mankind above the level of the brute depends, must naturally be confined within exceedingly narrow limits, until a written language has diffused it throughout all classes of mankind.

Before venturing to offer an opinion as to the origin of the Pushto language, it will be necessary to make a few observations respecting the topography, as it may be termed, of the ancient languages of Asia, more particularly those from which we may naturally suppose the Pushto or Afghánian language to have sprung; still all researches into high antiquity are more or less involved in darkness and perplexity, and every argumentative enquiry, however ingenious, must at last rest on the uncertain basis of conjecture and fancy.

According to the accounts of Herodotus and other ancient writers, we find, as is the case even at the present day, that in cer-

tain countries of no great extent, a variety of languages, totally distinct from each other, was used; whilst on the other hand again, the same language, with slight variations in its dialects, was spoken throughout regions of very great extent. The first remarks are applicable to nearly all mountainous districts, inhabited like Afghanistan by various tribes, for the most part independent of each other.

Throughout the boundless steppes of the Asiatic continent were spread the more prevalent languages. The limits of the various dialects also, were the same stupendous ranges of mountains, and the same noble and mighty rivers, which formed the boundaries of the different territories. Between the Attak or Indus, the Æman or Oxus, and the banks of the Dajlah or Tigris, one language appears to have predominated, a second between the Tigris to the Halys or Kizil Irmak, and a third betwixt the latter river to the Ægean sea.

To commence with the language which appears to have been most widely prevalent in ancient times, we find that from the Caucasian\* range of mountains on the north, to the Red sea on the south, and from the banks of the Euphrates on the east to the Halys on the west, one mighty tongue was spoken, which, with some slight variations, retained a primitive and distinct character, known as the Semitic, and of which the Arabic, Assyrian, Chaldaic, Cappadocian, Hebrew, Sarmatian, and Phœnician were merely dialects.†

From the Tigris eastward, as far possibly as the mountain range which forms the western barrier of the Indus, and from the Oxus to the Indian sea, another great language prevailed—the various dialects of which, both in elements and construction; as also in vocabulary and phraseology, were so totally distinct, as to preclude the possibility of their being of the same family as the Semitic. One peculiar feature of the ancient dialects of Persia is, that every vowel, whether short or long, has a distinct character. We are indebted to the labours of several eminent scholars in Zend literature for many important facts on this subject, particularly in the Zend Avesta

\* That is to say, what is at present known as the Caucasian range, not the Koh-i-Káf of the ancient Arabian authors.

† Heeren.

the sacred volume of the *Pársís* or *Guebres*, two English translations of which are about to be given to the world—one by a European Orientalist, the other by an Asiatic, and a disciple of *Sapetman Zoroaster*. From these researches we find, that three different languages were spoken in *Irán*\*—the *Zend*, in which the sacred books of their religion were written; the *Pehlavi*; and the ancient Persian, or *Pársí*. The date from which the *Zend* ceased to be the medium of conversation is unknown, but as early as the reign of *Bahmán*, the *Pehlavi* was considered rude, and on this account held in distaste at the court of that ruler;† and in the reign of *Bahrám Gúr*,‡ in the 5th century of our era, was proscribed by edict, and soon after fell into total disuse. After this event the *Fársí* became the idiom of Persia. It was divided into two dialects—the *Derí*, or court language, and the *Pársí*, which was spoken by the people at large. The *Shah Náme*h of *Ferdousí* is almost entirely written in the former tongue.

If we compare these dialects with the modern Persian, divested of the Arabic and Turkish, which, during a period of several centuries, has crept into it, we shall find them differing essentially in several respects; but at the same time, in phraseology and construction, bearing such a striking similarity, as to prove almost indubitably, that the dialects themselves, as also the people who spoke them, must have sprung from one and the same original stock.

It is a striking fact that no convulsions of government, no efforts of literature, can so alter a language as to destroy every atom of similarity between the speech of the present day, and that of most ancient and remote origin. Nothing but the total extirpation of the aborigines of a country appears capable of accomplishing so singular and wonderful a change. For a striking instance of this

\* The eastern name for Persia.

† According to the *Ferang Jehángírí*, *Bahmán* also called *Ardíshír*, was son of *Isfandiár*, son of *Kashtásib*, son of *Lohrásib*. Some say he was so called for his uprightness and justice; others, that it was from his precociousness as a child; and others, that it was on account of the length of his arms which were so long that his hands reached his knees. There are no less than thirteen meanings given to this word in the work I have quoted: he died A. D. 240.

‡ He ascended the throne A. D. 420, and reigned twenty years.



we have merely to look to the present dialects of the peninsula of India, or, for a still more conclusive proof, to the modern European languages, amidst the polish and refinement of Latin and Greek.

It appears, therefore, that the principal languages of the Asiatic continent, that is to say, what was considered Asia by the ancients, were the Semitic, and the Iránian or Persian,\* which latter was spoken as far as the western bank of the Indus, beyond which the Sanskrit and Prakrit commenced.†

In ancient times as in the present day, the greatest diversity of language appears to have prevailed in mountain tracts, generally inhabited by a number of independent tribes, who may either have been aborigines of those mountains, or strangers compelled to seek in them refuge from more powerful neighbours, or greater security from invasion and subjection to a sovereign's yoke. In the absence of facilities for communication with foreigners, their languages have been less liable to be mixed up with other tongues, and from the more numerous tribes again separating into smaller tribes, a variety of dialects was naturally formed, which in many points differed from each other.

The ancient languages of Persia, suggest other important facts not to be passed over without notice, and which also bring us to the point to which these straggling and imperfect remarks are intended to lead—that not merely in the modern Persian territory do we find languages which still exist, mixed up with others, and only preserved from oblivion by a few written remains; but that in the present day there is also a language spoken immediately west of the Indus, which is totally different in phraseology and construction from any

\* Heeren.

† “ With regard to the affinity of the language from Bactria to the Persian Gulf, it would of course follow, that the country being that of the ancient Persians, the Persian language would be spoken in it, varied as to dialect, but radically the same. If the language of Persia was Zend, this would have been in use throughout Ariana; and its strong affinity to Sanskrit would justify the extension of Strabo's remarks even to the Indians of the Paropamisus and the west bank of the Indus. With all the other divisions of Ariana there is no difficulty, even if the Persian of ancient did not materially differ from that of modern times; for Persian is still the language of the inhabitants of the towns of Afghanistan and Turkistan—Kabul and Bokhara.” *Ariana Antiqua*, pp. 122, 123.



modern tongue, and in all probability derived from the Zend, Pehlavi and the Hebrew. The language to which I refer is the Pukhto, Pushto, or Afghánián.

Languages can alone be fashioned and extended by oral use, though by writing and literature, their subsequent cultivation can be effected, and it is therefore certain that the dead languages of the Asiatic continent must at one time have been generally spoken,\* from the fact, that several living languages are evidently derived from them.† The cause of their ceasing to be the medium of communication may have arisen in various ways—the intercourse with foreigners brought thither by commercial pursuits, subjugation to the yoke of others, and such like circumstances, so affect a language as to produce various new dialects, which, as proved by our own mother-tongue, are capable of undergoing still further transformation.

There has perhaps never been a greater diversity of opinion, respecting the descent of any one people, than that of the Afgháns. Ferishtah‡ traces their origin to the Copts, whilst most oriental writers are of opinion that they are of Jewish family. According to Klaproth, Gatterer considers the Afgháns to be a Georgian race, and their language Georgian also. The Armenians hold the Afgháns to be descended from themselves; and Krusinsky, Reineggs, and several other European historians, notwithstanding the want of proof to support such an opinion, appear convinced of it. Major Keppel§ (now Earl of Albemarle) states that the people of Shirwán, and the adjoining countries, consider the Afgháns are descended from them. St. Martin|| in his account of the Armenian Arghowans, is of opinion, that the Afgháns cannot be identified with them. Other authors have declared them to be descendants of the Indú-Scythians, the Medians, the Soghdians, Turks, Tartars, and Monghols.¶

\* I have lately heard of a seal having been found near Pind Dadun Khan, in the Panjáb, bearing an inscription in the arrow-headed character.

† Heeren.

‡ *Tárikh-i-Ferishta*.

§ *Personal Narrative of travels*, vol. II. page 194.

|| *Memoires sur Armenie*, Vol. I. page 213 to 226.

¶ See *Tárikh-ul-Yamini* of Atbi, *Matlaa-us-Salátin*, and *Jami-ul-Tawárikh*.

The Afgháns themselves persist in their descent from the Jews, and their traditions on the subject trace their ancestry to Saul, king of Israel.\*

The best account I have met with on the subject, has lately fallen into my hands quite unexpectedly. It is contained in a history of the house of Saddo or Saddozoé tribe of the Afgháns. The work itself is written in 8vo. 640 pages of 17 lines to a page, and entitled, *Tazkirát-ul-mulúk*. It is very rare, and I imagine there is not a copy to be found east of the Indus, even if it has ever been heard of before by Europeans. Two-thirds of the entire work are occupied in the detail of events which have happened since the death of Ahmed Sháh, Abdálí. The commencement alone is sufficient for my present purpose; on some future occasion I may give a translation of that part which terminates with the death of the founder of the Dúrání monarchy. I may also add, that the work is written in Pushto. The account is as follows.

“The chief object of the author in writing this august work, was the compilation of a history of the ancestors of the tribe of Saddo, known as the Saddozoés, who, after the family of the last of the Prophets, (on whom be the blessing of the Almighty) are the greatest and best, as well as the most generous and open-hearted of the children of Adam.

“All traditions and histories agree, as to their exalted descent from the Ban-i-Israel, of whom their great ancestor is Malik Tálút (Saul) of the tribe of Israel, who afterwards became the ruler of that people. From Malik Tálút is descended Afghán, one of the greatest of God’s creatures, and who in the reign of Súlimán, was, by that monarch, made sovereign of the Jíns and Diws.

“From Malik Afghán, Abd-ur-Rashid bin Kais-al-laik, who was a contemporary of the prophet of God, and one of his most honoured associates, is a lineal descendant. He is the ancestor of the Sarbands, who are considered the first of the Afghán tribes, as also of the twelve *astanas* or families who were formerly considered as hereditary devotees.†

\* See Sir G. Rose’s *Afgháns, the Ten Tribes and the Kings of the East*, &c. lately published.

† Both Mr. Elphinstone, (*Kabul* Vol. 1st page 253) and Professor Dorn,

"His Highness Saddo chief of the Afgháns, being the fruit of the tree of that garden, and a blossom of that rose tree, this account of his ancestry has been compiled to the end, that their fame may be known to posterity.

"What can we inherit, but fame beyond the limits of the tomb."

"The following histories and authorities have been consulted in the composition of the work, viz. ;—*Tárikh-i-Salatín-i-Súreah* ; *Tabakát-i-Akbirí* ; *Aæn-i-Akbirí* ; *Mirát-ul-Afghánah*, which work was written by Khán Jehán, Ludhi, in the reign of the Emperor Jehángír ; *Tárikh-i-Sháhán-i-Safawiah*, *Irání* ; *Sháh Jehán Náme*h ; *Tárikh Alamgírí* ; *Furukh Seorí* ; *Tárikh-i-Mahommed Sháhí* ; *Nádír Náme*h ; *Tárikh Ahmed Sháhí* ; *Rassalah Akbar*, *Khadkah* ; and other information has been collected from the narratives of trustworthy persons. I have entitled the work, *Tazkirát-ul-Mulúk*, of the ancestry of the tribe of Saddo, the chief of the Afgháns. It consists of one *mukaddamah* (preface), two *asals* (originals), and one *khátímah* (epilogue).\*"

#### *Mukaddamah.*

On the forefather of Saddo, Chief of the Afghán people.

The great ancestor of this tribe is Malik Tálút (Saul) who is mentioned in the Korán and other works, as descended from Binyamín,

(Neamut Ullah, Part II. page 40) have fallen into error respecting this *fourth* grand division of the Afgháns, called by them respectively the Betnee, and Botni, Baiṭni, or Báṭiní. باطنی is not the name of a tribe, but is derived from the Arabic باطن

batin which means, *hidden, or knowing the hidden or concealed, hence the Almighty is often termed.* الباطن *Al Batin.*

\* The contents of the whole work are ;—*Mukaddamah.* On the forefathers of Saddo, chief of the Afgháns. First *Asal*. On the subject of those of the tribe who have ever dwelt in Afghánistan. This *Asal* is divided into two *Faræ* or Parts, 1st. Respecting that branch who have ruled over the whole tribe. 2nd. On the other members of the tribe, who still dwell in their native country. Second *Asal*. On that branch of the clan who left their country and took up their abode at Múltán. This is in five *Faræ* or parts. 1st. On the Khan Modud Khail. 2nd. The history of the Bahádúr Khail. 3rd. Account of the Kámrán Khail. 4th. Account of the Zoefarán Khail. 5th. The Khwájah Khizar Khail, who are generally known as the Súltán Khail, *Khodkah*. *Khátímah.* Account of the remaining branches of the Khwájah Khizar Khail, the descendants of Shah Dur-i-Durán, and their dispersion into various parts of India, and the Panjáb.



bin Yákúb, bin Issák, bin Ibráhím (may the blessing of the Almighty rest on them and on their house). Tálút was celebrated amongst his countrymen for his wisdom, knowledge, and mightiness in war; and the All-wise Creator of the Universe, made him king over Israel, and commanded him to bring to perdition the infidel Jálút, the enemy of his people.\*

At this time Mehtar Dáoud, who dwelt in the district situated between the territories of the rival princes, went and joined the army of his countrymen,† who were hard pressed by the superior army of Jálút.‡ The king on this account issued a proclamation to the effect, that whoever would go forth to fight with Jálút

\* And their prophet answered and said unto them, verily God hath set Tálút king over you, and hath enlightened his mind, and strengthened his arm : they answered, How shall he reign over us, seeing that we are more worthy of the kingdom than he, neither is he possessed of great riches ? Samuel said, Verily God hath chosen him before you, and hath caused him to increase in knowledge and stature." Al Korán. Chap. II.

"Now there was a man of Benjamin, whose name *was* Kish, the son of Abiel the son of Zeror, the son of Beehorath the son of Aphiah, a Benjamite, a mighty man of power.

And he had a son, whose name was Saul, a choice young man, and a goodly : and *there was* not amongst the children of Israel a goodlier person than he : from the shoulders and upwards *he was* higher than any of the people. 1st Samuel, Chap. ix. verses 1, 2.

So Saul took the kingdom over Israel, and fought against all his enemies on every side, against Moab, and against the children of Ammon, and against Edom and against the kings of Zobah, and against the Philistines : and whithersoever he turned himself, he vexed them.

And he gathered an host and smote the Amalekites, and delivered Israel out of the hands of them that spoiled them. 1st Samuel, Chap. xiv. verses 47, 48.

† Wherefore Saul sent messengers unto Jesse, and said, Send me David thy son, which *is* with the sheep.

And Jesse took an ass laden with bread, and a bottle of wine, and a kid, and sent them by David his son unto Saul. 1st Samuel, Chap. xvi. verses 19 and 20.

‡ Now Saul, and they and all the men of Israel, were in the valley of Elah fighting with the Philistines.

And David rose up early in the morning, and left the sheep with a keeper, and took, and went, as Jesse had commanded him ; and he came to the trench, as the host was going forth to the fight, and shouted for the battle." 1st Samuel, Chap. xvii. verses 19, 20.



(Goliath) and kill him, should receive the hand of the king's daughter in marriage, and be declared heir to the throne.

When Tálút went out to meet Jálút his troops, being seized with a sudden panic, fled from the field with the exception of 313 persons, who, by the will of God, took courage and remained with their king.\* It was at this time that Dáoud killed the infidel Jálút in single fight, after which the small but brave band which had stood its ground, fought with such determined courage that the enemy were entirely defeated and put to the rout.†

After this action on the part of Mehtar Dáoud, it became incumbent on king Tálút to fulfil the terms of the covenant which he had made, and accordingly he gave his daughter to Dáoud in marriage, and a patent of succession to the throne.

During the life-time of king Tálút, Dáoud served him faithfully, and at his death succeeded him. Armiah (Jeremiah) and Birkíya, Tálút's sons, were raised to the highest honors, became the captains of his armies, and continued in his service during their life-time.

In the common course of events, Dáoud himself set out on that journey from which no traveller returneth, and was succeeded by his son Súlímán. He appointed Afghána the son of Armiah, to the

\* "And Tálút said unto his soldiers, verily God will prove you by the river, for he that drinketh thereof shall not be on my side (but he shall be on my side who shall not taste thereof) except he who drinketh a draught of the water out of his hand. And they drank thereof, except a few of them. And when they had passed over the river, he and those who believed with him, said, We have no strength this day against Jálút and his host. But they who considered that they should meet God at the resurrection, said, How often hath a small army by the will of God, defeated a greater one, and discomfited it, for God is with those who patiently persevere. And when they went forth to battle against Jálút and his forces, they said, Oh Lord, pour on us patience, confirm our feet, and help us against this unbelieving people. Therefore they discomfited them by the Almighty will, and Dáoud slew Jálút." *Al Korán. Chap. II.*

† "And the men of Israel and of Judah arose, and shouted, and pursued the Philistines, until they came to the valley, and to the gates of Ekron. And the wounded of the Philistines fell down by the way to Shaaraim, even unto Gath, and unto Ekron.

And the children of Israel returned from chasing after the Philistines, and they spoiled their tents." *1st Samuel, Chap. xvii. verses 52, 53.*

command of his armies, and the government of the Jins and Diws;\* whilst Asif, the son of Tálút's son Birkíya, was made his principal minister.

One day king Súlímán seated on his throne and accompanied by his minister was journeying through the air,† when they passed the district of Rúdah, in which is situated the lofty mountain of Káseghar, which lies between Pesháwer and Kandáhár, and Kábul and Múltán. It is near the town of Darában and west of the Sindhu (Indus) river.

Pleased with the spot, and the salubrity of the climate, the wisest of men directed his minister to form a seat out of a stone which was at hand. This being almost immediately done, Súlímán sat in it for some time and enjoyed the beauty of the landscape which lay spread out at his feet. The mountain is known at present as the Takht or (Throne) of Súlímán.‡ A portion of the throne still remains, to which the people of the surrounding districts, are in the habit of making pilgrimages.

\* "This statement will not appear so fabulous if we compare it, with Samuel 2d. Chap. xxi. verses 15 to 22, for Diw, and Jin, mean—a giant as well as a demon or genii—*دیو* díw. A devil, a demon, genius, giant, spirit, ghost, hobgoblin. The Díws or Dives, Jins, Genii, or giants of eastern mythology, are a race of malignant beings. See *جن* also in Richardson.

† "No name is more famous among Muhammedans than that of Solomon. According to their belief, he succeeded David his father when only 12 years old; at which age the Almighty placed under his command, all mankind, the beasts of the earth and the fowls of the air, the elements, and the genii. His throne was magnificent beyond description. The birds were his constant attendants, screening him like a canopy from the inclemencies of the weather, whilst the winds bore him whithersoever he wished to go. Every age and every nation have had their fooleries, and even many of the received opinions of modern times will not bear the touchstone of Truth. The sorcery laws of our country are a far more authentic disgrace to human nature, than all the wild, yet pleasing fables of the East." See Richardson.

‡ "In the southern part of the Wuzereee country, where this range is passed through by the river Gomul, it is low in both senses, and forms the lofty mountain of *Cussay Ghur*, of which the Tukht of Súlímán, or Solomon's Throne is the highest peak." Account of the kingdom of Cabul. vol. 1st page 164.

"I was told that on the top there was a holy stone or rock, the seat of a Musalman Fakir, whose name it bears; but I venture to doubt the story." Vigne's Ghuzni, Cabul, &c. Page 61.

The mountain tract of Káseghar, and the district of Rúdah, were assigned in feudal tenure to Afghána.

The original meaning of the word *Afghana* is *fighán*—a Persian word, which means “*complaint*,” “*lamentation*,” because he was a cause of lamentation to the devil, jíns, and mankind. From the constant use of the word, the vowel point (ـ) *kasrah* was dropped, after which the other letters could not be sounded without the aid of a vowel, and *alif-i-wasl* was placed before the *gh*, and thus made Afghána.

Malik Afghán having taken possession of his new territory, (to use the expressive words of the author) “irrigated the land of that mountainous country with the water of the sword, and planted in the hearts of its inhabitants, the seeds of his own faith. He fixed his residence at a place named *Púsh* or *Pásh*, situated in the mountains, and from the name of this place, the people have derived the name of Pushtún, and their language Pushto. Some traditions state that the Afgháns acquired their language from the Diws, and others, that it is the original dialect of the aboriginal inhabitants of Káseghar, and that the Afgháns were in the habit of carrying off the wives and daughters of those Infidels, and intermarrying with them,\* thereby learning from them the Pushto language, and in course of time forgetting their own Ibrahámí tongue.†”

Again to use the words of the author, “Malik Afghán having purified the face of the mistress of that country from the filth of the wicked infidels by the pure water of the sword, and having given unto her the rouge of beneficence, and decked her out in the bridal garments of religion and the ornaments of Islam, bestowed her in the marriage of possession to one of his sons,” after which he returned to the court of king Súlímán, at Bait-ul-Mukaddas,‡ where at length he died at a very advanced age. His descendants from generation to generation, and from tribe to tribe, continued to dwell round about the mountain of Káseghar and to rule over it, and were at constant war with the Infidels, as the neighbouring people were termed.

\* See the Kullasat-ul-Ansáb.

† Ibrahámí means the Hebrew language.

‡ بَيْتُ الْمُقَدَّسِ The Sanctified or Holy Temple—the Arabic name for Jerusalem.



At length, during the chieftainship of Abd-ur-Rashíd bin Kais al Laik, an event happened which was the cause of shaking the world to its very foundations\*—the joyful tidings of the last and greatest of the Prophets, resounded both in Arab and in Ajam, and Abd-ur-Rashid became desirous of making a pilgrimage to Mekka for the purpose of seeing him :—

“ Love ariseth not alone from seeing the object ;”

“ This wealth is often acquired by mere conversation.”

In company with several of his kinsmen and friends, he set out for the Hedjáz, and having arrived at Mekka, performed his pilgrimage according to the rites and tenets of the religion of his forefathers, Israel, Issák, and Ibráhím.† He now set out for Medina, and on the road fell in with the celebrated Khalid-ibn-Wálid, “ the sword of God,”—to whom he explained the object of his journey. They travelled towards Medina in company, and on his arrival there, Abd-ur-Rashíd became a convert to Islám. In the numerous struggles of that period, he became conspicuous for his intrepid bravery, which made the Prophet bestow on him the surname of *batán* or *patán* ‡ (batán or patán) which in Arabic means the *mast* of a vessel, without which it cannot sail, neither can the ship of war sail along without the mast of battle.

Abd-ur-Rashíd having acquired great renown, at length obtained his dismissal, and was allowed by the Prophet to return to his native land, but was at the same time enjoined to publish and diffuse the doctrines of Islámism amongst his countrymen. He departed from Medina, and in due course reached his home in safety, after which

\* Allowance will of course be made for religious prejudice.

† “ The temple of Mecca was a place of worship, and in singular veneration with the Arabs from great antiquity, and many centuries before Muhammad. Though it was most probably dedicated at first to an idolatrous use, yet the Muhammadans are generally persuaded that the Caaba is almost coeval with the world ; for they say that Adam, after his expulsion from paradise, begged of God that he might erect a building like that he had seen there, called Beit-al-Mamúr, or the frequented house, and al-Doráh, towards which he might direct his prayers and which he might compass, as the angels do the celestial one.” Sale’s Introduction to the Korán Page 83.

‡ This word I cannot find in either Kámus, Burhan Kátæe, or Richardson.



he converted his family and tribe to the new faith, and taught them the Korán. He made war on the infidels with greater zeal than ever, and was celebrated for his piety. At length finding his end approaching, he called his family and tribe around him, and enjoined them to keep their hearts fixed on the only true religion, and their feet firm in the path of Islám; to show friendship and obedience to the followers of Muhammad, and to make war on the infidels, and convert them to the only true faith. After taking an affectionate leave of all, "the swallow of his soul having escaped from the wintry cage of this world, took its flight towards the summer mansions of eternal bliss."

He was blessed with three sons.—Sarí, Gharí, and Tabrí. The first known as Sarban or Sarband, succeeded his father in the chieftainship, and gave name to one of the two great divisions of the Afgháns called Sarbans. The second also called Gharghasht, gave name to the Gharghashts. The descendants of these three sons constitute the whole of the different Afghán clans, with their numerous branches and ramifications.

The tribes which are included in the Sarban division, are ;—Abdálí, Tarín, Barech, Mabánah, Gharshín, Shírání, Bábarí, Kánsí, Jamand, Kátaní, Kalíání, Tarkání, Khalíl, Mhomand, Dáouddzoé,\* and Yúsufzo'e. The twelve *Astánahs* or families who are considered sacred by the other Afgháns, from their progenitors having been devotees, are also included amongst the Sarbans. The Abdálí, Tarín, Bábarí, Jamand and Yúsufzo'e tribes have each one family, the Khalíl three, and the Mhomands four.

The different branches of the Gharghasht division or offspring of Gharí, are ;—the Surání, Jailam, Drukzo'e Afrídí, Chakání, Jankí or Jangí, Kerání, Bábí, and Mashwání tribes.

The third son, Tabrí, is the progenitor of the Ghalzo'e, Lúdhí, Níazí, Lohání, Sorbaní, and Klakpúr clans, the whole of whom are styled Tabríns. It is said there was an illicit connexion between one of the daughters of Tabrí, and Mast Ali Ghorí,† and after a short time

\* Zo'e in Púshto means, son—zái is a corruption of the word.

† The ancestor of the Ghorían Sultans who conquered Ghazní, in 1152. *غل* *ghal* in Púshto means a thief, and *زوي* zoé a son, hence *غلزوي* Ghalzoé the son of a thief; *زاي* is a mere corruption of the word.

the fruits of this amour becoming apparent, the father, to make the best of a bad matter, gave her to him in marriage. Three sons were the offspring of this marriage—Ghalzo'e of whom she was pregnant before the nuptial knot was tied,—Lúdhí, and Sarwání.

The tribes above mentioned are the whole of those who are of pure Afghán descent—the offshoots of the three sons of Abd-ur-Rashíd, Pátan. He was buried at Káseghar, and succeeded by his eldest son Sári, who was constantly at war with the Kafirs or Infidels. He had two sons—Sharkabun, and Kharshabun. The Sarbans are the descendants of the former, and the Yúsufzo'es, Mohmands, Khalíls and other tribes inhabiting the plain of Pesháwer, are the children of the latter.

On the death of Sári, Sharkabun his son was acknowledged chief of the Afghánah. He was celebrated for his piety and wisdom. In his wars with the infidels, he not only acquired great wealth, but also increased his territory, and brought many of the neighbouring tribes under his authority. During his chieftainship Kandáhár, and Kábul were conquered by Hújáj bin Yúsuf, Sakafí, who was governor of Khorásán for the Khalífah Abd-ul-Malik bin Mirwán who reigned from 692 to 698 A. D. This event greatly increased the authority of Sharkabun, and established his power more firmly than before.

He is said to have been succeeded by Abdál his son. Some accounts mention that he was the son of Sharkabun, and others that he was his grandson, but neither of these accounts can be correct, as there is a space of nearly three hundred years between them; Sharkabun being a cotemporary of Hújáj bin Yúsuf Sakafí, before referred to, whilst Malik Abdál lived in the reign of Máhmúd bin Sabuktagín, who succeeded his father to the throne of Ghazní, in the year of the Hijrah 387. This great hiatus between the reigns of these two chiefs may be accounted for in the following manner. It often happens, that the names of those chiefs who have been celebrated for their wisdom, bravery, piety, or numerous progeny, have been alone handed down to posterity, and those of mediocrity set aside and forgotten. There is an instance of this with regard to Hasham\* and Abd-ul-Shams, who were both sons of Abd-ul-Manáf.

\* The great-grandfather of Muhammad.

The descendants of the former are still styled Ban-i-Hasham, whilst those of the latter are known as the Ban-i-Omeyah, from Omeyah the celebrated son of Abd-ul-Shams, and thus the father's name has been dropped altogether. In the same manner, Malik Abdál having acquired a great name for his bravery, equity, and generosity, and surpassed many of his predecessors in grandeur and dignity, his name has been handed down to us, whilst the very remembrance of those of little or no celebrity, is now altogether lost in oblivion. This is the great cause of the confusion which often takes place in the geneological histories of different tribes and people, and hence the reason why Malík Abdál has been called the son or grandson of Sharkabun.

Malik Abdál thus became chief of the Afghánah—Sarbars, Ghar-ghashts, and Tabríns. During his reign the people began to pay attention to agriculture, and the lands about Káseghar were brought under cultivation. Abdál, who was famed for his bravery, followed in the path of his ancestors by making war on the people of the surrounding parts, in the plundering of whose property his followers acquired great wealth. A number of the infidels who dwelt in the vicinity of the Káseghar district, was also at this time converted to the Muhammadan faith. At length the Afgháns having no infidels to plunder, and insufficient land to yield them a subsistence, began to take service under the Ghaznívíd Súltáns, from whom they obtained the district of Bagrá'm, now known as Pesh'-áwer, as a feudal fief.\* Of the countries to the north, such as Suwat,

\* The account contained in the *رياض المحبت* (Gardens of Friendship) by Mahábbat Khán differs in some respects from the preceding narration. He says, "up to the time of the Prophet of Islám, the descendants of Afghánah dwelt in the Salmán mountains, at which period Kais was their chief. He subsequently went to Arabia to do homage to Muhammad, taking with him eleven persons of his tribe, who with himself became converts to the new faith.

"He returned to his native land, but in the following year he again returned to Arabia with seventy of his tribe, and joined the followers of Muhammad a short time previous to his attack on Mekka, in which affair, and the subsequent operations, Kais behaved so well, that the title of Abd-ur-Rashíd was conferred on him, and he soon after returned to his home.

"After the death of Muhammad, Kais Abd-ur-Rashíd, with a number of his people followed the two succeeding Khalifs in their wars; and when the Khalif



and Bajawer, which were in the hands of the Kafirs, they got possession by force of arms. They also obtained grants of land at Ghazní and Kábul, from Súltán Máhmúd and his successors, and by degrees began to emigrate from the neighbourhood of Kaseghar, and

Osmán determined on the conquest of Khorásán, he requested Kais to obey the orders of Abd-ullah bin Aémir bin Kárez, who had been appointed to head the expedition. This chief had been directed to settle the Afghán tribe with their families, after the conquest of that province, between it and Hindústán, that they might become a barrier against invasion from the latter country. Kais assisted in the conquest of Khorásán, after which, the tract of country lying between Hirát and Kandáhár was bestowed on him and his tribe, subject to the governor of the province.

“At the period of the struggles between the Omeyahs and Abbásís, which ended in favour of the latter, the Government of Khorásán was administered by Hújáj bin Yúsuf, Sakafí, who sent an expedition into Hindústán, under his nephew Kásim bin Muhammad bin Yúsuf, Sakafí, who was accompanied by a strong body of Afgháns. They advanced through the district of Roh,\* and at length reached Múltán, after annexing the former district, which was made over to the Afghán tribes, with directions to keep under the refractory Hindús. From the occupation of Roh by the Afgháns, they obtained the name of Rohillas.

“Sabuktagín the founder of the Ghuzniwíd dynasty, and father of the great Muhammad, entertained a number of Afgháns in his army. When that ruler died, Ismaail his son by the daughter of Alta'kin, the owner of Sabuktagín, for the latter was originally a slave, succeeded his father, but Muhammad, another son by the daughter of the chief of Zábúlistán (Kábul) opposed him in the succession, and a civil war ensued between them. The Afgháns who were dependent in some measure on that chief, joined his son-in-law Muhammad, who defeated Ismaail, and confined him in a fortress.

“In gratitude for this effectual aid on the part of the Afghánah, Muhammad gave his sister in marriage to Sá'ho the chief of the tribe, by whom he had three sons—Salár, Mas'œud, and Ghází, who are buried at Baráj.

“When Sultán Muhammad set out on his expedition against Samnáth in Gúzerát, he took with him a body of Afgháns. Several times during the siege of that stronghold, fortune seemed to incline against the Muhammadan arms, but at length the Afgháns were brought to the front, who having fastened the skirts of their garments together, attacked the Hindús with such fury that the latter were entirely defeated, but not until the victors as well as the vanquished had sustained immense

\* The Belúchís and other inhabitants of the Deráh Ghází Khan, and those of the southern part of the Deráh Ismaail Khan districts, speak of the mountain range immediately west of the Indus, to the southern boundary of Afghánistán, by this name.



settled in those places they considered best suited to themselves. Up to the time of Malik Abdál, the whole of the tribes considered and obeyed him as their head and chief, but now each tribe and village began to choose their own governors, and ceased to pay that respect and obedience to his authority, which they formerly did ; in fact they fell headlong into the slough of arrogance and presumption.

Abdál was succeeded by his son Malik Rajar. This prince—a second Nimrod—was passionately fond of the sports of the field, in which he spent the best part of his days and nights. He was blessed with four sons—Ėsau, Nur, Khokai, and Makou, the first of whom, a God-fearing and just personage, succeeded him in the chieftainship : the others gave name respectively to the Núrzo'e, Khokarí, and Makou tribes.

The remainder of the Abdálís, and other clans, which had up to the present period continued to dwell in the Káseghar district near the Takht-i-Súlímán, finding it too small to support so many families, began, in the hot season, to migrate with their flocks, to the neighbourhood of Kandáhár, returning again to their old haunts at Káseghar in the winter.

Malik Ėsau had three sons, Zírak, Is'hák, and Alí. On his death he bequeathed the turban of authority to Zírak, his sword to Is'hák, and his carpet for prayer to Alí. From these two latter, the Is'hákzo'e, and Alízo'e branch of the Abdálís are descended, and from them is also descended the only one of the twelve *astánahs*, or families who are devoted to the priesthood, as already referred to.

Zírak, who was a wise and able chief, governed his tribe with energy and ability. He completely rooted out the crimes of impiety, adultery, and dishonesty, which appear to have been but too prevalent at the period in question.

The five tribes which have been already mentioned as the Abdáli clan, viz ; Is'hakzo'e, Alízo'e, Núrzo'e, Khwagání, and Makou, are known as the Panjpa'o branch.

My own opinion is that Malik Abdál was a cotemporary of Súltán loss. In reward for this important service, the 'Breaker of Idols,' bestowed on each of the Afgháns the Túrki title of Khán : their former title of Malik was derived from Malík Tálút." Rí'áz-i-Mahábbat.

Máhmúd, Ghaznívide, Malik Zírak of Shah Rukh Mirza, son of Amír Timúr, Gúrgání, between whose reigns there is a period of some three centuries. As has been already noticed, the names of the most celebrated chieftains can alone have been preserved by their countrymen, whilst those of less fame have sunk into oblivion.

The district of Rúdah and Káseghar, as before stated, not being of sufficient extent to support the great number of people, to which the Afgháns had by this time increased, Malik Zírak was induced to send an agent to Shah Rukh Mírzá,\* at Hírát, for the purpose of soliciting a grant of the districts round Kandáhár. This request was favourably listened to by the Sháh, and Zírak in consequence gave directions to the Abdálí, Barech, Tarín, Jamad, Ghalzo'e, Kákur, Kásí, Bábur, and other tribes—who were more numerous than the extent of their lands could support—to proceed to Kandáhár and settle on the lands granted by the Sháh in that district. To each tribe a portion of land was given, in proportion to the number of families of which it consisted, and for which ground they had to pay a small tax to the Governor of the province.

Zírak had three sons—Popul, Bárak, and Alako, from whom have sprung the Populzo'es, Bárakzo'es and Alakzo'es. At his death Popul succeeded him in the chieftainship of the whole Afghánah people. Being a sagacious and intelligent chief, and endowed with the tact of government, he kept the whole of the tribes under subjection and obedience. They also were generally well satisfied with his government, but at the same time, those who showed any opposition to his authority, were punished by the Kandáhár Governors, and this tended still more to keep all under proper restraint.

Popul had also three sons—Habíb, Bádú, and Aiyúb. The two former were by one mother, and the latter by another wife. Some also say that Aiyúb was the son of the first wife by a former husband.

Bádú was the ancestor of the Bádúzo'es, and Aiyúb of the Aiyúbzo'es. At length Popul suddenly finding his end approaching, sent for his children, and after giving them much good advice, and exhorting them to follow in the footsteps of their ancestors, departed this life, leaving the chieftainship of the tribes in the hands of his eldest son Habíb.

\* The accomplished son of the great Timur.

The children of Afghána who had now become a numerous people, and had, up to this time, paid obedience to the authority of their chief, began to show symptoms of restlessness, and dislike to the yoke of Habíb's supremacy. At length they commenced quarrelling amongst themselves, and the *khails* or clans of every village having declared themselves independent, set about nominating their own chiefs. All was uproar and confusion; the rich tyrannized over the poor, and the strong plundered the property of the weak; might was right, and villainy, impiety, and depravity reigned supreme.

Malik Habíb endeavoured for a long time to stem this torrent of rebellion, and regain his lost authority over his people, but without success; and at length not one tribe remained on his side. The Taríns, Barechis, Ghalzo'es, Kákurs, Shíranís, and others, each set up one of their own tribe as pretenders to the chieftainship, raised the standard of revolt, and commenced a civil war. The life of Habíb was spent in civil contentions, which were entirely without avail. He had three sons—Bámí, Ismáaíl, and Hasan, from the two last of whom are descended the clans of Ismáaílzo'e, and Hasanzo'e.

Bámí, who was of a mild disposition, and possessed of many excellent qualities, succeeded his father as nominal head of the Afgháns. Súltán Bahlol Ludhí, and his son Sikunder, emperors of Hindústán, were on friendly terms with him, and sent him from time to time various costly presents. This produced great envy in the hearts of the pretenders to the chieftainship, and they despatched agents with presents to these potentates. Their agents without being admitted to an audience even, were dismissed with the answer, that the Súltáns neither knew of, nor recognized any other head of the Afgháns than Malik Bámí. He had four sons—Sálih, Ali, Zaiyl, and Warukah. They were fathers of large families, and their names have been perpetuated in the separate clans, bearing their respective names.

Bámí died at an advanced age, and the shadow of chieftainship which now alone remained, descended to his eldest son Sálih, who became head of the Habíbo'e tribe, which consisted of the three smaller ones of Ali, Zaiyl and Warukah, just mentioned, who acknowledged and supported his authority. He was a man of great piety and generosity, and his threshold was never clear from the



crowds of poor, nor his table from the numerous guests. In his lifetime Shír Shah, and Salím Shah, who were of the Shorkhail branch of the Afgháns, sat on the throne of Delhí; and the friendship which had sprung up between his father and the Lúdhía Emperors, was renewed and kept up with the former princes also. At length the vicissitudes of fortune wrested the sovereignty from the grasp of the Ludhís, and placed it in the hand of the Moghal; but when Shír Shah in the year 951 of the Hijerah,\* sallied forth to regain the throne of his ancestors, the Afgháns assisted him with a powerful force of their countrymen, and Hindústan was regained. When the agents of Malik Sálíh presented his letter of congratulation to Shír Shah, the Emperor observed to his ministers and court, that Malik Sálíh was not only his own chieftain, but that his forefathers, from the time of Malik Afghán, were the chiefs of his forefathers also; and that the family of Malik Sálíh had no equal in rank amongst the whole of the Afghán tribes. Shír Shah, after thus acknowledging Sálíh as his head and chief, and treating his agents with great distinction, dismissed them with numerous presents for their master.

“At length in the reign of Sháh Tamásíb, Sufawí, in the year of the Hijerah 965, on the night of Monday the 17th of the month Zú’l-híjjah; the bright orb of Saddo rose from the eastern horizon of the black goat’s hair tent of Malik Sálíh, and diffused his refulgent beams on the surrounding world.”

With the birth of Saddo, the ancestor of the great Ahmed Shah, Abdáli, the Introduction to the Tazkirát-ul-Mulúk closes.

Sir John Malcolm’s words on the origin of the Afgháns are—“Although the right of the Afgháns to this proud descent is very doubtful, it is evident from their personal appearance, and many of their usages, that they are a distinct race from the Persians, Tartars, and Indians, and this alone seems to give credibility to a statement which is contradicted by so many strong facts, and of which no direct proof has been produced.”

Sir William Jones was of opinion that the Afgháns are the Paropamisadæ† of the ancients, but this is very improbable, for it is proved by the statements of many authorities, besides that of the

\* A. D. 1544.

† See Quintus Curtius’s Life of Alexander. Book 7.



work from which I have given an extract, that the Afgháns are not the aborigines of the country they at present inhabit, but have gradually advanced from the west of Asia, and it is not improbable, but that during the lapse of ages, they might have been forced from various causes, to emigrate from the districts in the vicinity of Jerusalem, as stated in the tradition I have quoted. The Seah-Posh Kafirs are in all probability the Paropamisadæ of the writers of antiquity, respecting whom, on some future occasion, I hope to offer some remarks.

According to the Makhzan Afgháni, after Feridún's victory over Zohák, the latter was subjected to such acts of tyranny, that his children fled for safety to the mountain tracts of Ghor, which at that time was only inhabited by a few scattered tribes of the Israelites, Afgháns, and others. If Jewish families could, at that period, have been inhabitants of Ghor, it is equally possible that the Afgháns themselves might have come originally from the Holy Land.\*

The mountain districts of Afghánistan heard not the "Allah Akbar" of the conquering Arabs, until the fourth or fifth century of the Hijerah, by which time the sun of their power had commenced to wave. Up to this time even, we find that the Kafirs or Infidels inhabited the mountain districts of Ghor, and continued to dwell there up to the thirteenth century of our era, when Marco Polo visited those regions.†

The Yúsufzo'e tribes, who now hold the whole of the districts to the north of the Lundy Sind, or Kábul river,‡ were even in the time

\* In the reign of Saosduchinus king of Babylon, called in scripture Nabuchodonosor the First (A. M. 3335. Ant. J. C. 669) the prophet Tobit, who was still alive and dwelt among other captives at Nineveh, a short time before his death, foretold to his children the sudden destruction of the city, of which at that time there was not the least appearance. He advised them to quit the city before its ruin came on, and to depart as soon as they had buried him and his wife. The Jews, at this time being captives, to follow the advice of Tobit, would have had in the first place to have escaped from Nineveh by stealth, and having accomplished this much, where could they hope to find a more secure retreat, than towards the east, and in the direction of the mountainous tracts now inhabited by the Afghán tribes? See Tobit C. XIV. V. 5-13.

† Travels of Marco Polo; Marsden's Translation. Book I. Chap. 22. pp. 122.

‡ *Lundy Sind*, in Pushto signifies the "Little river," in contradistinction to the *Abu Sind*, or "Father of rivers," as the Indus is termed.

of Báber but new comers, and in this, his statement agrees with the account in the *Tazkirát-ul-Mulúk*. In another place Báber mentions the people of Bajawer, as "rebels to the followers of Islám, and besides their rebellion and hostility, they followed the custom and usages of Infidels, while even the name of Islám was extirpated from among them."\* From this it appears that the people of the country had been converted to Muhammedanism, and relapsed again to idolatry, but were *not* Afgháns.†

Nowáb Allah Yár Khán, son of the Nowáb Háfiz Rahmat Khan,‡ in the preface to a lexiographical work of which he is the author, states, that "there are two divisions of the Afgháns, whose language also differs in many respects, so that the words used by some tribes are not known to, or understood by, others. They are termed Pushtún and Pukhtún and they speak the Pushto and Pukhto§ respectively. The former is the western dialect, having some affinity to the Persian, and the latter the eastern, containing many Sanskrit and Hindí words. The people who dwell about Kábul, and Kándahár, Shora'wak and Pishín, are designated Bar Pushtún or upper Afgháns from *بر* above; and those occupying the district of Roh, which is near Hind (India) are called Lar Pukhtún or lower Afgháns from *لر* below."

He describes Roh, about which has been, and still continues to be, great diversity of opinion, as "bounded on the east by Suwat and Káshmir, west by the Helmund river, north by Káshkár or Chitrál and Kafiristán, and south by the river or sea of Bukker, called in Persian Níl-áb, (The Blue Water) and Níl'aow or Abá-Sin, (The Father of Rivers) by the Afgháns."

The author of the *Ferang-i-Jehángirí* gives a somewhat similar account of it; "Roh," he says, "is the name of a range of lofty mountains, in length extending from Suwat and Bajour, to Síwní, which is in the district of Bukker in Sind, and from Hassan Abdál

\* Báber's Memoirs, page 248.

† "Although Bajour, Sewad, Peshour, and Hashnagar, originally belonged to Kabul, yet at the present time some of these districts have been desolated, and others of them entirely occupied by the tribes of Afgháns, so that they can no longer be properly regarded as provinces." Ibid, page 141.

‡ The author of the *Khullasat-ull-Ansáb*.

§ Merely in substituting sh for kh, z for g, etc.

(in the Sínd Ságur Doába, of the Panjáb) to Kándahár in breadth, and in this highland range the latter city is situated."

I have been told by Afgháns in the vicinity of Pesh'áwer, and other places, that their ancestors first came from a district named Ghwárí Margháb, which they said lies to the westward of Khorásán. This is, however, a mistake; a small village bearing this name, and the place referred to by them, is situated about mid-way between Kándahár, Shoráwak, and Girishk, which is one of the old seats of the Afghán tribes who now occupy the Pesh'áwer valley. Ghor, supposed to have been the original district of the Afghána, lies much to the north. It was from this latter place that the Ghoríán tribe issued in the year 1152. A. D. when they overturned the throne of the Ghazníwíd Súltáns.

The diversity of opinion regarding the origin of the Afghána, is not greater than that respecting their language, of which, at the time I write, with the exception of a small brochure by the late Major R. Leech of the Bombay Army, no grammar exists.\* I have just completed a grammar which, together with a dictionary in preparation, will, perhaps enable the learned both of Europe and India, to give a better, and more decided opinion than heretofore on the affinity of the Afghán language to those of ancient Asia.

Sir William Jones's opinion was, that the Pushto or Pukhto language has a manifest resemblance to the Chaldaic, but Professor Klaproth vehemently denies this, and states, that nothing whatever is known regarding this dialect; that neither in words or grammatical structure, is there the slightest resemblance between Pushtú and any Semitic language, and that it is unquestionably a branch of the great Indú-Germanic division of languages.†

The Baptist Missionaries of Serampúr again consider the Pushto and the Belúch‡ languages, to form the connecting link, between those of Sanskrit, and those of Hebrew origin.§ M. Adelung, in his

\* Since writing the above, Captain Vaughan of the Bengal Army has published a Grammar.

† It is to be hoped the Professor will change his opinion now, as regards the latter part of this sentence.

‡ The Beluchkí is a mixture of Persian, Sindhí, Hindí, and Sanskrit, with some original words.

§ They also notice the numerous pure Hebrew roots to be found in Pushto.



Mithridates vol. 1st, page 225, considers Pushto an original and peculiar dialect, but at the same time acknowledges his acquaintance with it to be very slight.

Mr. Elphinstone, in his work on Kabul, vol. 1st, page 302, with reference to the Afghánian language, considers that its origin cannot be easily discovered. He remarks, "a large portion of the words that compose it, as also most of the verbs and particles belong to an unknown root, and in this portion are included most of those words, which from the early necessity for designating the objects they represent, must have formed parts of the original language; yet some of this very class belong to the Zend and Pihlavi, such as the terms for father and mother, sister and brother." He also further states, that out of two hundred and eighteen Pushto words, not one had the smallest appearance of being deducible from any of the Semitic languages, but that a resemblance (five out of one hundred and ten words) can be traced between it and the Kúrdish, considered to be an Indú-Germanic tongue.

One of the most decided proofs against the erroneous idea that the Afgháns are the aborigines of the territory they at present inhabit and that the Pushto is the original dialect of those countries, consists in the facts brought to light in the decyphering of the Bactrian, and Indú-Scythian coins. M. Lassen in his interesting and erudite work\* on this subject, very truly observes; "I indeed know that some have pretended to recognize the Afgháns in eastern Kábul, even as early as Alexander's time; not so Mr. Elphinstone,† who rather proves their immigration into Kábul at a much later period. This conjecture has originated with professor Wilken‡, who thinks he recognizes the Afgháns in the Assakanes. If these were indeed Afgháns, the Afghán language would have been spoken throughout Kábul, and the language of the coins must be the source of the Pushto. Without observing, that neither ancient authorities nor modern Afghán history§ admit or require this supposition, the cor-

\* Points in the history of the Greek and Indú-Scythian Kings in Bactria, Kabul, and India. Page 116.

† Account of Kábul. Volume II. pp. 10, 33, 44, 50 & 56.

‡ Abhandlg. der Berlin, Acad. 1818-19 p. 261.

§ Báber does not mention any thing about Afgháns at Kábul, when he took that city.



rect assertion of the learned academican himself, that the Afgháns belonged to the Medo-Persic tribe, is at variance with it; the As-sakanes inhabited a country, where even in the 7th century A. D. an Indian language was spoken."

As the learned professor urges—if the Afgháns were the aborigines of the countries they at present inhabit, the Afghánian language must, as as a matter of course, have been generally spoken. Had such been the case, the language on the coins, must have been the source of Pushto, but no similarity whatever exists between them.

The Afgháns, although subdivided into numerous tribes, are undoubtedly one race, and speak one original language. Had they been the aborigines of the country at present known as Afghánistán, we must have heard something of them from ancient writers, for we find that even in the time of Herodotus, Darius had sent an exploring expedition under Scylax of Caryanda and others as far as the Indus.\* That the whole of the regions west of Jelálábád or even as far west as Kábul, were peopled by a Hindú race, most ancient writers agree to, as also that they were of different tribes, and spoke different languages. Herodotus says—"There are many nations of Indians, and they do not speak the same language as each other; some of them are Nomades, and others not."†

Again the father of History observes. "There are other Indians bordering on the city of Caspatyrus and the country of Pactyica, settled northwards of the other Indians, whose mode of life resembles that of the Bactrians."‡ The country here referred to, the same as Scylax and his companions started from on their voyage down the river, is the present district of Pakhli, north of Attak. The Indians are in all probability the ancestors of the race who still occupy that district, the Suwatees, and the people of Astor and Gilgit.

\* "A great part of Asia was explored under the direction of Darius. He, being desirous to know where the Indus, which is the second river that produces crocodiles, discharged itself into the sea, sent in ships both others on whom he could rely to make a true report, and also Scylax of Caryanda. They accordingly, setting out from the city of Caspatyrus and the country of Pactyice, sailed down the river towards the east and sunrise to the sea." Melpomene IV. 44.

† Ibid. Thalia. III. 98.

‡ Thalia, III. 102.

It is therefore evident that the Afgháns have immigrated into their present territories from the westward,\* and that the aborigines, the Seah Posh Kafirs, or Black-clad Pagans, the Suwatees, and the people inhabiting the hills to the north-east of Suwat, on the one side, and possibly the Belúchis and Jats on the other; have been forced by the gradual advance of this powerful race, to move to the north-east and south-west respectively.

\* The empire of the Great Cyrus extended, according to the best authorities, from the Ægean to the Indus, and from the Euxine and Caspian to Ethiopia and the Arabian sea. As it was customary to transport a whole tribe, and sometimes even a whole nation from one country to another, and as the Jews were ever a stiff-necked race, is it not possible, that the Great King may have transported some of the most troublesome amongst them to the thinly-peopled provinces of the east, where they would be too far away from their native land and captive countrymen to give trouble in future? Or, as I have remarked in another place, is it not probable as well as possible, that those of the Jews who could effect their escape, might have fled eastward, preferring a wandering life in a mountainous country, with independence, to the grinding tyranny of Cyrus's successors and their Satraps? In fact there was no other direction to which they could have fled, except towards the north, inhabited by the Scythians who would have massacred, or at least made slaves of them or sold them as such; or eastward, which being mountainous and but thinly peopled, was likely to afford them a permanent and secure retreat. According to Ní'ámut Ullah, Zohak's children, to escape the exterminating vengeance of Ferídún, fled for refuge to the Kohistan of Ghor, and settled there; and at his time, its only inhabitants were some scattered tribes of the Israelites, Afgháns, and others.

There are a number of Jews to be found in the south-west parts of India, and in the Bombay Army there are a great number. Where did they come from? and when did they come?

Again in the 5th year of Darius (A. M. 3488; Ant. J. C. 516.) Babylon revolted and could not be reduced until after a siege of twenty months. It is therefore probable that the Jews, of whom a considerable number remained at Babylon, went out of the city before the siege was formed, as the prophets Isaiah and Jeremiah had exhorted them long before, and Zachariah very lately in the following terms: "Thou daughter of Zion, that dwellest with the daughter of Babylon, flee from the country and save thyself." Isaiah. xlvi. 20. Jeremiah l. 8 li. 6, 9—45. Zachariah ii.

It also appears that Ochus son of Artaxerxes Memnon, carried a number of Jewish captives into Egypt, and many others into Hyrcania, where he settled them on the coast of the Caspian A. M. 3653, Ant. J. C. 351; might not some have been sent eastward also? See Solin. C. 35, Euseb. in Chron. etc.

I formerly entertained an idea that some affinity might exist between Pushto and the language of that strange people, the Gypsies, but subsequent enquiries have convinced me to the contrary; and I find that no trace of similarity exists between them. This may also be seen by reference to a comparative table of languages which I shall shortly publish.

Whether the Afghánian language be a dialect of the Semitic, of Zend or Pihlavi origin, or of the Indian stock, I will leave for others better qualified to decide. Before entering into any investigation on the subject, it must be borne in mind, that “no efforts of the learned, can ever so far alter a language, as to deface every line of resemblance between the speech of the present day and that of even the remotest ancestry: nothing but the absolute extirpation of the aboriginal natives can apparently accomplish so singular a revolution.”\* As an instance of this, we have merely to examine the present language of Persia, and the different dialects of the continent of India; or for a still more convincing proof, to look into the Gothic and Celtic original of the modern European languages, amidst the polish and refinement of the Greek and Latin.

Before bringing these rambling remarks to a close, I must notice a few of the most striking peculiarities of the Pushto language, which will, in some measure, serve as a guide in investigations as to its origin and affinity to the other dialects of the Asiatic continent. It will however be well, first to point out the best and most effectual method of ascertaining the *real* affinity of oriental languages.

Baron William Humbolt, in an essay on this highly important subject remarks; “I confess that I am extremely averse to the system which proceeds on the supposition that we can judge of the affinity of languages merely by a certain number of ideas expressed in the different languages which we wish to compare. I beg you will not suppose however, that I am insensible to the value and utility of the comparisons: on the contrary, when they are well executed, I appreciate all their importance; but I can never deem them sufficient to answer the end for which they have been undertaken; they certainly form part of the data to be taken into account in deciding on the affinity of languages, but we should never

\* Richardson's Dissertation, etc.



be guided by them alone, if we wish to arrive at a solid, complete and certain conclusion. If we would make ourselves acquainted with the relation between two languages, we ought to possess a thorough and profound knowledge of each of them. This is the principle dictated alike by common sense and by that precision acquired by the habit of scientific research.

“I do not mean to say, that, if we are unable to attain a profound knowledge of each idiom, we should on this account entirely suspend our judgment: I only insist on it that we should not prescribe to ourselves arbitrary limits, and imagine that we are forming our judgment on a firm basis, while in reality it is insufficient.

“But further, I am convinced that it is only by an accurate examination of the grammar of languages, that we can pronounce a decisive judgment on their true affinities.

“If two languages, such for instance as the Sanskrit and the Greek, exhibit grammatical forms which are identical in arrangement, and have a close analogy in their sounds, we have an incontestible proof that these two languages belong to the same family.

“The difference between the real affinity of languages, which presumes affiliation as it were among the nations who speak them, and that degree of relation which is purely historical, and only indicates temporary and accidental connexions among nations, is, in my opinion, of the greatest importance. Now it appears to me impossible ever to ascertain that difference merely by the examination of words; especially, if we examine but a small number of them.

“But whatever opinion may be entertained with respect to this manner of considering the difference of languages, it appears to me at all events demonstrated: First, that all research into the affinity of languages, which does not enter quite as much into the examination of the grammatical system as into that of words, is faulty and imperfect; and, Secondly, that the proofs of the real affinity of languages, that is to say, the question whether two languages belong to the same family, ought to be principally deduced from that alone; since the identity of words only proves a resemblance such as may be purely historical and accidental.”

There are nine letters of the Arabic alphabet which never occur in pure Afghánián words,—ث, ح, ذ, ص, ض, ط, ظ, ع, غ, and ف, and



therefore the language really contains but twenty-nine letters, including five peculiar ones, to which, after a careful comparison of six hundred alphabets, I find that there is no similarity as to form or sound, either in Arabic, Zend, or Sanscrit, but characters similar in sound are contained in most of the Semitic, and some Tártárian dialects. The Pushto letters with the corresponding ones in the languages referred to are as follow.

𐎧 *ts* or *tz*, pronounced *tse* or *tze*, has an equivalent in the Chaldaic 𐎶 *ts*, Hebrew צ *tsóde*, Samaritan 𐤛 *tsáde*, Syriac ܛ *tsode*, Ethiopic and Amharic ጸ *tza*, Armenian Ձ & *tza*, Palmyren 𐤥 *ts*, Phœnician 𐤥 or 𐤦 *ts*, Punic 𐤥 *ts*, Kufic 𐤥 *ts*, Georgian 𐌖 *ts*, Mongolish 𐠿 *ts*, Mandchú 𐡄 *tza*, Thibetan 𑄧 *ts*, Albanian 𐌒 - 𐌖 *ts*, Corean ㅈ - ㅊ *ts*, and the Japanic ㄷ - ㅌ - ㅍ - *tse*.

𐎡 *dz* or *ds*, pronounced *dze* or *dse*, similar to the Hebrew י *dsain*, Aramáic ܝ *ds*, Palmyren 𐤢 *ds*, Phœnician 𐤢 *ds*, Kufic 𐤢 *ds*, Syriac ܝ - ܝ *dzain*, the Assyrian cuniform 𐎶 - 𐎶 *dz* or *ds*, Armenian Զ & *dza*, Greek ζ *zeta*, Georgian 𐌕 *ds*, Mongolish 𐠿 - 𐠿 *ds*, and Corean ㅈ - ㅊ *ds*, Mandchú 𐡄 - 𐡄 *ds*, Japanic ㄷ *dz*.

𐎶 *urray*, for which with perhaps the harsh *rh* of the Armenian ր, there is no equivalent in any of the known dialects of the old world. Some persons and among them Major Leach, have considered the Sanskrit lingual ॠ as similar in sound, but it is merely necessary to hear it pronounced by an Afghán mountaineer to convince any one of the total difference, indeed, it is almost impossible to give a proper idea of its sound in writing. Kufic 𐤢 *r*, is like it in form. 𐎶 *khin* bears some similarity to the 𐎶 - 𐎶 *k'ch* of the Chaldaic, and with this exception, no sound like it is to be found amongst the letters of the six hundred alphabets before referred to.\*

𐎶 or 𐎶 *'urrún*, is a combination of the sound of *s'urray* and 𐎶 *nún*, the latter nasal. It is quite impossible to acquire the real pronunciation except from an Afghán mouth when using the word 𐎶

\* See Die Schriftzeichen des gesammten Erdkrieses. Vienna. 1851, also, Alphabete orientalischer und occidentalischer Sprachen zum Gebrauche für Schriftsetzer und Correctoren. Leipzig. 1850.

the *eye-lash*, or نَري *stone*. The ن *'rún* of the Sindian language is something like it.

Pushto also, like the Semitic dialects, of which family I am inclined to consider it, has the *t'h* with a strong aspiration to which sound the Persians have an unconquerable antipathy; indeed their mouths seem to be so formed as to be unable to utter it. Like the Jews and Egyptians, as well as the Arabs, the Afgháns uniformly give the hard sounds, *t'h*, *d'h*, *ds*, *dtz*, *dz*, etc., to those characters which the Persians have ever softened to *z* and *s*. The pronunciation too, is somewhat difficult on account of the use of several gutturals, and the combinations of such letters as شپ, کڅ, خک, etc., which are difficult to enunciate.

In harshness of pronunciation, and in the declensions of its nouns, it bears great resemblance to the Zend and Pehlavi, and like the former language, can be, and often is, written in old works, on which alone we can place dependence, by distinct letters in the body of each word, instead of introducing the short vowels. Of the affinity of the Zend and Sanskrit at present there is no doubt, but the Pehlavi appears to have a greater affinity to the Arabic, and to differ little from the present language of Persia.\*

In Arabic and Persian it is impossible to sound a consonant which may be the first letter of a word, without the aid of a vowel, whilst in Pushto there are numbers of words beginning with a consonant immediately followed by another; as, شپه *shpah*, night, روځ *rwadz*, day, غلا *ghlá*, theft, پښتانه *khkatak*, below.

The vowels and consonants used in Pushto have the same powers as those of the Arabic, Hebrew, and other Semitic dialects. Like them it has two genders—the masculine and feminine, but the former have a dual form, which is wanting in the latter. In this respect the Afghánián also differs from the Zend and the Sanskrit, but agrees with the Pehlavi, from which the modern Persian is derived. In common with the Hebrew, Arabic and Persian, it has the peculiar separable and inseparable pronouns, the latter being

\* Sir William Jones has stated, that “having compared a Pehlavi translation of the inscription in the Gúlistán on the diadem of Cyrus, and from the Pázend words in the Ferang-i-Jehangírí, he became convinced that the Pehlavi is a dialect of the Chaldaic.”—Asiatic Res.

invariably attached to some preceding word, whether a noun, verb, or particle. When attached to nouns they signify possession or propriety, and with intransitive verbs in the course of conjugation, are used in the place of personal pronouns, and with transitives point out the objective case.\* This is also a peculiar feature of the Sindíán language, which has several letters in common with Pushto besides its own peculiar ones. The inflexions of the Afgháníán verbs too are formed, inflexions are conjugated according to the Arabic and Hebrew system, with two original tenses only—the *mázi* or past, and the *muzáræ* or aorist, the past participle being used in the construction of the compound tenses, with the aid of the auxiliary, *to be*. Another peculiarity is, that the intransitive verbs agree in gender with the nominative, whilst the transitives are governed both in gender and number by the objective case. In many respects the Pushto syntax agrees with that of the Hebrew, and I have no doubt but that much greater affinity will be found to exist between them, if compared by any one well versed in the latter language.

The Pushto language is spoken with considerable variation in orthography and pronunciation, from the valley of Pishín south of Kandáhar, to Kafiristán on the north; and from the banks of the Helmand on the west, to the Attok, Sindhu, or Indus on the east—throughout the Sama or Plain of the Yúsufzo'es, the mountainous districts of Bajawer, Pánjkora†, Suwat, and Bunír, to Astor on the borders of Little Thibet—an immense tract of country equal in extent to the entire Spanish peninsula.

The numerous convulsions to which the country of the children of Afghána has been subjected for the last seventy or eighty years, have necessarily affected their language also; hence the great variation observable in the orthography and mode of writing of modern Pushto works. On this account, no dependence whatever can be placed on any manuscript of later date than the reign of the founder of the Durání empire—Ahmed Shah Abdáli—authors—for it is almost impossible to find two copies of one author, unless written by one person, agreeing on these essential points. I have in my

\* See Hebrew Grammar by Prof. Lee, p. 80, Art. 153, p. 260, Art. 220. London. 1827.

† *Kor* is the Pushto for house, and *Pánj* the Persian for five.

possession a rare prose work, which was written in the reign of the Emperor Aurengzeb, which I picked up in a most out-of-way place,—a pawn shop at Bombay. The mode of writing and orthography in it, I have generally adopted, together with that of the Makhzan Afgháni, in my grammar above alluded to.

The assistance which I have derived from a knowledge of the dialects of the neighbouring territories, to six of which I have devoted many years, has been very great; indeed more than I can well express. It has enabled me to trace words of Arabic, Persian, Túrki, Sanskrit, and Hindí origin, greatly garbled in orthography, and vitiated in pronunciation, which a person unacquainted with them in any way, would in all probability set down as pure Pushto.

As an example of this, I will mention one instance alone. M. Klaproth in his apparent eagerness for classing the Belúch language, which is a mixture of Persian, Sindhí, Panjábí, Hindí, and Sanskrit, amongst the Indú-Germanic family of tongues, commits an error, from, I fancy, ignorance of the Persian language. He gives the following table :\*

| <i>Beluch.</i> | <i>German.</i> | <i>Latin.</i> | <i>Greek.</i> | <i>English.</i> |
|----------------|----------------|---------------|---------------|-----------------|
| Shash          | Sechs          | Sex           |               | Six             |
| Hapt           |                | Septem        | Hepta         | Seven           |

Now the Persian for six is شش *shash*, and seven is هفت *haft*, which two words,—to all appearance have a greater affinity to the Belúch words here mentioned, than to either German, Latin, Greek, or English; in fact they are precisely the same words, for ف is used for and pronounced پ indiscriminately, and would be written exactly the same in both languages. If we consider that Belúchistán is merely separated from the Persian province of Kirmán by a range of mountains, the similarity is naturally accounted for, without leaving Asia for that purpose, as the learned Professor appears to have done—“*Ea sub oculis posita negligimus : proximorum incuriosi, longinqua sectamur.*”

Unlike most Eastern nations, the Afgháns appear to regard women in a great measure on an equality with themselves, in this world at least; and the latter generally receive some sort of education.

\* I am indebted for this to Thornton's Gezateer.



Some of the Afghán females of the higher class, are famous for their knowledge of Pushto which they read and write. The daughter of the late Dalíl Khán, Arbáb, or chief of Torú,\* near Pesháwer, is celebrated for her learning, and general proficiency in the Afghán language. Pesháwer, some fifty or sixty years since, was one of the principal seats of Muhammadan learning, and by many was considered a more learned city than even Bokhárá itself.

The custom is for boys and girls of from five to twelve years of age to go to the same school. After learning the letters they immediately commence reading the Korán in Arabic, but of course without understanding it. On its completion they begin to read some Púshtú work usually a commentary on the Korán, or an explanation of the rites and ceremonies of their faith, such as may be found in the work entitled Rúshíd-ul-Ay'án, or some such religious subject. After the twelfth year, the girls either attend a dame's school, or, if their parents can afford it, are taught at home. Sometimes boys under twelve years of age, go to a dame's school with grown up girls of fifteen and upwards; but this custom is only prevalent at a distance from towns, as in most large places there are separate schools for males and females. The scholars either pay a small sum monthly to their teacher, or make him a present after having completed the perusal of the Korán, according to the position and means of their parents. Amongst some tribes a portion of land is allotted to the Mulla or Priest, who also acts as village school-master.

The Afghán language, taking all things into consideration, is by no means poor in literature. There are numerous poets, of whom Abd-ur-Rahmán who flourished in Aurengzeb's time, is perhaps, the best known and most generally esteemed. He was a Mullá or Priest, and his writings, which are of a religious character, are collected in the form of a Dewán—the form in which most of the poetical works are arranged.

The next most popular poet is Khushhál Khán who was chief of the powerful clan of Khattak in the time of the Emperor Aurengzeb,

\* Torú, or Tolú, is a town or cluster of villages in the Yúsufzo'e country, about eleven miles north of Nohshaira, and containing about 5000 inhabitants.

and passed his life in struggling against the oppressive power of that monarch. The following verse from a poem written during his confinement in the fortress of Gwalior by the Emperor, is characteristic of the man.

Cheer up then heart ! I have by me,  
A healing balm for every throe—  
That Khúshhál Khán's an Afghán true,  
Aurengzeb's mortal foe.\*

Khushhál was also author of a History of the Afgháns, which work is now very rarely obtainable, and of a translation of Pilpay's Fables (the Anwárí Soheli of the Persian) entitled *Æ-yár Dánish*, or the "Touchstone of Wisdom. He also wrote a small volume on the forms of prayer, and other religious matters.

The poems of Ahmed Shah, Abdáli, the great founder of the Durání monarchy, and conqueror of the Múrathí host at Paníput, are principally in an amorous and metaphysical strain, and contain a number of difficult Arabic words. His poetry is highly esteemed, perhaps more so, than its merit demands.

The next author to be noticed is Mullá Abd-ul-Hamíd who flourished in the time of Timúr the son and successor of Ahmed Shah. His odes which are mostly of an amorous or moral tendency contain many fine sentiments. He is the Shaik Saadí of the Pushto, and I must say, that I prefer his works to any of the others. His works are entitled, *Dur-wo-Marján*—Pearls and Corals.

Futtih Khán, Yusufzoe,† surnamed Mirzá, the next poet in point of popularity was a Súfi, and his works are a mass of mysticisms. He served in the wars of Aurengzeb in Guzerat and the Dekkan in 1686 and the following years.‡

Kasím Ali Khán of the notorious tribe of Afrídí, is the author of a Dewán, but his odes also bear the stamp of mysticism. He was born at Furakábád in India, in the time of Nowáb Muzaffar Jung,

\* I regret that want of space will not allow me to give the poem entire.

† Some say he was of the family of Bázid (Báyízíd) Ansá'í, the founder of the Roshnián sect, called Pír Tárek or Saint of Darkness, by Akhund Darweza.

‡ I have in my possession the copy of his works which belonged to the Hon'ble Mr. Elphinstone.

and according to the account given of himself in one of his odes, he was acquainted with Afghání, Arabic, Túrki, Persian, Hindí and a little English. He has devoted one entire ode to the abuse of the English, just arrived in India, whom he calls “a nation of shop-keepers, who in Hindustán have turned into soldiers.”

The romantic and interesting poems of Saif-ul-Mulúk and Badrí Jamál, by Gulám Muhammed, and Bahrám Gur, by Fy’áz, must not be overlooked. The authors who are but little known, are said to have flourished in the seventeenth century, which appears to have produced most of the Pushto authors.

The other poetical works most generally known are, *The Tale of Súltán Jumjumah* by Emám-ud-Dín, *Mæraj Nameh* by Gulám Muhammed, *Rashíd-ul-By’án* by Akhund Rashid, *Mukhammas* of Abd-ul-Kádír, *Majmúæát-i-Kándaharí*, and some others of less note.

The prose writings are numerous, but with the exception of the romantic story of Adam Khán and Durkhání mentioned by Mr. Elphinstone in his “*Account of Kábul*,” and a few others, they are mostly on divinity. The principal are, the *Fawá'id-ush-Sharri'æa*, written by Akhund Kásim in 1560; *Makhzan Afghání* by the celebrated Akhund Darwezah\* who lies buried at Pesh'áwer; the works of Bábu Ján, said to have been a converted Seah Posh Kaffir who again relapsed; the *Jung Nameh* containing the history of Hussan and Hussain, by Gulám Muhammed; *Núr Nameh* by Ján Muhammed; *Gúlistán-i-Rahmat* by Nowáb Muhammed Mustajib Khán in 1800; *Tafzír*—a translation from the Koran; *Hazár Masá'il*; *Hiyát-ul-Mumínín*; *Akhír Nameh*: and several others.

Besides the original Afghán writings, there are also numerous translations from Arabic and Persian authors, both poetical and prose. Amongst those which have come under my own observation are, the *Gúlistán* of Saadi, translated by Amír Muhammed, Ansarí; *Yúsuf* and *Zulíkhá* of Jámí, by Abd-ul-Kádír; *Majnún* and *Laila* of Jámí,

\* Professor Dorn in his *Chrestomathy* states that Akhund Darwezah was the first author who composed in the Afghán language, but he neither states how he has arrived at this conclusion, nor his authority for such a statement. In the same manner he considers Khushhál Khán to be the author of *Adam Khán* and *Durkhání*, but neither the one nor the other is actually known.

by Bai Khán of Bunír; the Kasídah Surí'ání; and the Kasídah Bardah by Akhund Darwezah.\*

There are two valuable lexicographical works, the Rí'az-ul-Mahábat (Gardens of Friendship) by the Nowáb Háfiz Mahábbat Khán, compiled at the request of Sir George Barlow in 1805-6. It is an extensive work of about 700 pages small folio, but is chiefly devoted to the conjugation of the Afghán verbs, which are exceedingly difficult from their irregularity. The author however was a native of Hindústán, and many peculiarities regarding the verbs and tenses, have been omitted. The vocabulary is valuable. The other work entitled Æ-ajá'ib-ul-Lughat (Curiosities of Language) was written about the year 1808, by Nowáb Alláh Yár Khán of the Barech tribe who was also a native of India. The work contains 640 pages of 17 lines to a page.

Kasim Ali Afrídí, in one of his odes, besides the authors already mentioned, gives the names of several others—Dowlat, said to have been a Hindú, Meher Alí, Sikunder, Ashráf, Arzání, Mukhlis, Karim Khán, Kázim Khán surnamed Shaidah, Allah Dád, Karím Dád, Fázil, Latarr, and Meher Shah, but they are little known.

There is a host of ballad writers, and some of their compositions, sung by the wandering minstrels are very spirited, and put me in mind of those of our own land. During my residence at Pesh'áwer I had several of them written out. The following is a specimen of one which I have attempted to turn into English ballad style, re-

\* The so-called translation of the Old and New Testaments made by the Serampore Missionaries in 1818, bears a very slight resemblance to the sacred writings; in fact it is quite ridiculous and quite painful to read. I will merely give one specimen, the well known verse from the Sermon on the mount—"Judge not, that ye be not judged." the Pushto is in the following terms انصاف مكوئئې دپاره د *Do not justice unto any one, lest justice shall be done unto you ! ! ! !* Is this Christian doctrine? verily, if the Infidels are to judge of our religion from such translations as this, it is not to be wondered at that they should scoff at, hold our faith in ridicule, and call us Káfirs or Blasphemers. It is quite evident that in making this translation the English has been merely transposed for the Pushto without the slightest consideration as to difference of idioms, style, and arrangement of the languages. I trust the other translations of the Scriptures are better than the Pushto one.



taining in some measure the metre of the original. The translation is almost literal.

*The Fight at Nohshaira.*

The battle of Nohshaira was fought in 1823, between the Afgháns under Sirdár Mahommed Azím Khan, Bárakzo'e, brother of Dost Mahommed Khan, and the Seiks under Runjít Singh, in which Abbás Khan Khattak was slain, besides a host of Yusufzo'es.

In misery and grief I'm plung'd,  
By ruthless Fate's decree ;  
Alas ! that from its cruel laws,  
There's no escape for me.

What shall I say of Abbás Khán,  
That Khattak chief so bold ;  
At his sad fate I'm sorely griev'd,  
And that by me 'tis told.

He first did march to Wuzír Bágh,\*  
Where cypresses do wave ;  
And there he muster'd all his clan,  
They were like lions brave.

He from Pesh'áwer then did start,  
For Azím Khán to fight ;  
And with five hundred Khattaks true,  
He reach'd Nohshair that night.

\* The Wuzír Bagh or Minister's Garden lies outside the city of Pesh'áwer to the south. It contains a residence, and was remarkable on account of the number of cypress trees it formerly contained. The garden was laid out by Sirdár Futtih Khan, the celebrated Wuzír of Mahommed Shah, and the brother of Dost Mahommed Khan, Bárakzo'e at present ruler of Kábul. The garden has since been chiefly occupied by the other brother Sultán Mahommed Khan, and his numerous Hárem.

When morning dawn'd, the Seiks advanc'd,  
The Afghán host to crush ;  
But Gházis\* they, on Nának's sons'†  
Did like a torrent rush.

On Khaiber's heights, when rains do pour,  
And wintry blasts do blow ;  
The little rills, to torrents swell'd,  
All Jamrúd's plain‡ o'erflow.

That day they kill'd of Singhs enough,  
Of heads to raise a dome ;  
But 'twas decree'd Nohshaira's plain,  
To them should be a tomb.

At eventide, the chieftain's steed,  
Fell' midst a heap of slain ;  
By night, his band, oh ! where were they ?  
Dead on the bloody plain !

Night clos'd round him, still he fought,  
All faint and out of breath :  
A Hourí's§ hand the Sherbet gives,  
The Martyr meets his death—

To spare his life, the Seiks they did  
Pledge every sacred word :  
No Heav'n they dread—deceitful foes !—  
They put him to the sword.

\* Ghází—one who fights against infidels : a gallant soldier.

† Nának—the name of the Saint of the Seiks and the founder of the sect.

‡ “Jamrúd's plain”—“After heavy rains in the mountains, the rivulets, swelled to torrents, rush from the hills with violence, and carry every thing before them”

§ Hourí—a black-eyed nymph of the Mahommadan Paradise, of which, every true believer is to have no less than seventy-two.

In Akorá when\* this tale was told,  
The people were dismay'd ;  
And when night came, the hero's corse,  
They from the field convey'd.

It seem'd the latter day was come,  
So sore aggriev'd were they ;  
And minstrels did their rebeks break,  
Deep sorrow to display.

Next morning from Akorá then,  
Set out a mournful train ;  
And to Pesh'áwer bore the corpse,  
Of him so basely slain.

The people of Pesh'áwer wept,  
When they his fate did hear ;  
And then they laid the body in,  
The grave-yard of Panj Pír !†

Hakím ! lament for Abbás Khan,  
That Khattak chief so bold ;  
Oh where ! the like of him, oh where !  
Shall we again behold.

\* Akorá— is a small town about ten miles west of the Indus or Attok : it is the chief town of the Khattak tribe.

† “ The grave yard of Pánj Pír ”—The Zí'arat-i-Pánj Pír, or the shrine of the five saints, is situated about a mile south-east of Pesh'áwer.

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*Indian Oology—Notes on the Nidification of some of the commoner birds of the Salt Range, with a few additional from Kashmir, by W. THEOBALD, Junr. Esq.*

The present paper is the result of observations made during the years 1852-3, chiefly in the neighbourhood of Pind Dádan Khán and Katás, in the Salt Range, with a few scanty notes made during a flying trip of a month to Kashmir.

The only paper on the same subject I have seen is one by Capt. Tickell, with which in one or two instances my own notes will be found to differ. Layard and Kelaart have also given brief notices on the same subject from which one curious fact may be deduced, viz. that the same birds nest at various times in different parts of the country, a fact by no means surprising when the great extent and varied physical, seasonal and climatic features of our Indian empire are taken into consideration.

At present however, we must content ourselves with the careful exploration of particular districts without attempting to follow out the laws which doubtless regulate these seeming anomalies, which would require much more extensive information than we are at present possessed of.

It is not easy to explain why Oology has not found more favour with those whose taste or opportunities incline them to cultivate some of the minor branches of natural science, for without any undue bias it may at least be reckoned as entertaining and instructive, as many of those "ologies" which are usually considered pleasing, and withal, not unfashionable. Many however, who are ready enough conventionally to tolerate other similar pursuits, can, without being able to assign any particular reason, see in Oology little else than trifling and loss of time, but it requires very little examination to upset such an estimate, for there are few similar studies, if any, that surpass it in interest, few more varied, and none offering a less worked field of enquiry and speculation.

What varied and touching instances of craft and devotion does not the maternal *στοργή* prompt for the concealment and preservation of the callow brood either from natural enemies or from unforeseen perils, and where can we look for more pleasing instances of self-



denial than among birds engaged in tending their eggs or young. This has ever been a favourite and admired subject with poets and lovers of nature, who will not fail to accept in a far wider sense, than originally attached to them, the lines of Flaccus.

“ Non ferox

Hector vel acer Deiphobus graves

Excepit ictus pro pudicis

Conjugibus puerisque primus.”

At no time too, are more conclusive proofs displayed by the brute creation of intellectual power, than by birds engaged in the duties of incubation. It appears indeed little less than absurd and a mere prejudice, to deny this faculty to the inferior animals, for if reason be defined in terms, their actions in a greater or less degree will be found to fulfil those terms with those of man himself, without doubt unmeasurably the highest in every respect of living forms, but between whom and the humbler inhabitants of the earth, that absolute gulph does not exist which his pride—his reasoning pride—has induced him to surmise.

The strong sense of Milton did not fail to see and acknowledge this, for Eve addressing the serpent, says :

“ What may this mean? language of man pronounced

By tongue of brute, and *human sense* expressed?

The first at least of these I thought denied

To beasts, whom God on their creation-day

Created mute to all articulate sound

The latter I demur, for in their looks

Much *reason*, and in their actions, oft appears.”

This passage shewing an acquaintance with and appreciation of the habits of animals, far from common at the time he wrote, affords a pleasing insight into the character of our great poet.

I shall now offer a few remarks as to the means I have found best, after some failures and losses, for preserving the fragile objects under consideration, in the hope they may prove of some service to other collectors.

There are three ways which may be adopted for emptying an egg according to its size and the amount of incubation it has received. All eggs when fresh or only slightly incubated may be blown after

a manner I shall now describe, but some care and careful handling are required to succeed with such eggs as of the English wren or Indian palmswift. The ordinary mode which the young idea usually aspires to inculcate into grandmamma is to make a hole at *both* ends, but the plan I adopt is preferable to the infantile custom, as from requiring a single hole, it does not so much damage or blemish the shell. On deciding on the proper spot which is best in the side, an oval hole must be made varying with the size of the egg, and on holding the hole downwards the contents are easily evacuated by blowing into the egg through a fine pointed blowpipe, the lip of which is just introduced within the shell.

The operation is neat and effectual but a violent blast must not be attempted, as in that case the yolk may cause a momentary obstruction and the egg explode from the pressure of the confined air within. Neither should the hole be made too large, as the air will then find too ready an exit and fail to expel the last portion of the contents. The empty shell should then be immersed in water and filled; by first exhausting the air with the blowpipe, this will effectually clean the interior, and the last remains of moisture may be absorbed on blotting paper. The interior should then be washed with a solution of corrosive sublimate in spirits. A common six penny brass blowpipe answers perfectly for this.

When however, the incubation has lasted a long time, a good plan is to extract the contents by means of a pin bent into a hook. This is a tedious operation which I merely mention in case of any rare egg requiring to be so treated. A third plan answers well for all eggs of a large or medium size, when well incubated. A moderately sized hole must be made in the eggs and the more liquid portion of the contents got rid of. They should then be wiped clean and placed in a shallow pan, when in a few days the maggots of the flesh-fly will consume the contents. They will then only require to be washed; an operation performed with the greatest comfort by one labouring under a severe cold, or glorying in an equally philosophic nose with the ingenuous doctor in "*Humphrey Clinker*." The best mode of packing moderate sized eggs in store is in wooden boxes with saw dust, after closing the holes in the shells with their paper. Tin boxes are not generally to be trusted, at least travelling,

as with such tender charges committed to their care a little smash goes a great way as I have ruefully learned from experience. Small eggs travel well packed in some soft nests as those of "*Lanius*" with a little wool and placed in wooden boxes. Small tin boxes fitted into trays in a wooden box are also very handy but are not readily got well made in this country.

For the nomenclature adopted in the present paper I am indebted to my friend Mr. Blyth, in several cases from the examination of skins of birds shot off the nest, and with a few exceptions, no reasonable doubt attaches to the correct identification of any bird in the present paper; those to which any uncertainty attaches are indicated by an asterisk.

The tabular form I have chosen as most convenient; the LOCAL NAME is ranged under the specific in the second column, the next contains the MONTH and WEEK in which the eggs are laid, the last column the colour of the eggs and a description of the nest.

In the penultimate column, three heads are contained. The number of eggs; usually ascertained from well incubated eggs, to guard against error. The form of the eggs expressed by letters; and the measurement of the long and short axes in inches and decimals of an inch. The following are the commoner forms in the abbreviations used:

|                      |                             |               |
|----------------------|-----------------------------|---------------|
| O. Oval.             | P. Pyriform.                | R. Round.     |
| B. O. Blunt oval.    | O. P. Ovato Pyriform.       | With some mi- |
| P. O. Pointed ditto. | B. O. P. Blunt ditto ditto. | nor combina-  |
| L. O. Long ditto.    | L. O. P. Long ditto ditto.  | tions.        |
| R. O. Round ditto.   | R. O. P. Round ditto ditto. |               |

|   |                                       |                                  |                                                         |                                                                                                                                                            |
|---|---------------------------------------|----------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <i>Gyps Bengalensis</i> , .....       | March 1st, 2nd, .....            | 1. O. P. ....                                           | Dull white.<br>Nest of sticks, and twigs in large trees.                                                                                                   |
|   | Gid Girij.                            |                                  | $\frac{3.36}{2.62}$                                     |                                                                                                                                                            |
| 2 | <i>Neophron percnopterus</i> , ...    | March 3rd, .....                 | 2. L. O. ....                                           | Pale brownish red, thickly blotched with dark brownish red.<br>Nest, a few twigs placed in holes of cliffs and difficult to approach.                      |
|   | Safed-doda.                           |                                  | $\frac{2.53}{1.90} \frac{2.75}{1.84}$                   |                                                                                                                                                            |
| 3 | <i>Haliaeetus Gallicus</i> ? .....    | March 2nd, 4th, April 2nd, ..... | 1. B. O. = L. B. O. ....                                | Pure white, with sometimes a few spots of brown.<br>Nest of sticks in large tree.                                                                          |
|   | Burra ludi.                           |                                  | $\frac{2.78}{2.13} \frac{2.67}{2.30} \frac{3.18}{2.30}$ |                                                                                                                                                            |
| 4 | <i>Circus gallicus</i> , .....        | March 2nd, .....                 | 1. O. ....                                              | White with a few minute brown specks.<br>Nest of twigs and sticks in large trees.                                                                          |
|   | Chota ludi.                           |                                  | $\frac{2.49}{1.90}$                                     |                                                                                                                                                            |
| 5 | <i>Poliornis tees-a</i> , .....       | April 2nd, .....                 | 4. O. P. = B. O. P. ....                                | Pure grayish or plumbeous white.<br>Nest small, of twigs, in trees, near cultivation.                                                                      |
|   | Trumti.                               |                                  | $\frac{1.80}{1.50} \frac{1.93}{1.50}$                   |                                                                                                                                                            |
| 6 | <i>Buteo canescens</i> , Hodgson, ... | March 1st, 4th, .....            | 2-3. O. P. ....                                         | Greenish white, or white, blotched with red or claret brown—vary greatly.<br>Nest large in trees, sticks lined with cotton, rags, &c. and daubed with mud. |
|   | Hil.                                  |                                  | $\frac{2.00}{1.66} \frac{2.19}{1.66}$                   |                                                                                                                                                            |



- 7 *Lanius lahtora*, ..... March 4th, ... 5. O. P. ....  
     Lahtor (generic.)       $\frac{1.06}{0.80}$   
     Pale greenish white, blotched and ringed with yellowish gray and neutral markings—vary much in intensity and colour.  
     Nest of twigs, lined with cotton or wool, and usually placed in stiff thorny bushes.
- 8 *Lanius erythronotus*, ..... May 1st, 4th, ..... 5-6. B. O. P. ....  
      $\frac{0.88}{0.81}$   $\frac{0.93}{0.68}$   
     White or pale greenish white slightly ringed and spotted with yellowish gray and neutral.  
     Nest of roots, coarse grass, rags, cotton, &c. lined with fine grass and placed in forks of trees.
- 9 *Lanius Hardwickii*, ..... May 1st, 4th, June 2nd, 3.4 O. P. = B. O. P. ....  
      $\frac{0.80}{0.64}$   $\frac{0.87}{0.65}$   $\frac{0.73}{0.55}$   
     Colour same as No. 8, also creamy or yellowish white, spotted with darker.  
     Nest compact, in forks of thorny trees; outside fibrous stalks, bound with silk or spider web and covered with lichens or cocoons imitating a weathered structure; inside lined with fine grass and vegetable down.
- 10 *Corvus-corax*, ..... January, February, ... 4. O. P. ....  
      $\frac{1.70}{1.30}$   
     Dirty sap green, blotched with blackish brown; also pale green, spotted with greenish brown and neutral.  
     Nest of sticks, difficult to get at, placed in well selected trees or holes in cliffs.
- Dom-kak Doda.

- 11 *Corvus splendens*, ..... June 4th, ..... 5. O. P. .... Clear bluish green, spotted with blackish brown, size and colour variable.  
 1.42 1.40 1.56 1.70  
1.05 0.95 1.18 0.97  
 Nest, a neat but slight cup of twigs and roots, placed in medium sized trees.
- 12 *Columba intermedia*, ..... March, April, May, June, July, ..... 2. P. O. = B. O. .... Pure white.  
 1.63 1.43  
1.04 1.17  
 Nest none, or only a few twigs in holes, in walls, buildings, cliffs, &c.
- 13 *Turtur risorius*, ..... April 3rd, May 1st, September 1st, ..... 2. P. O. = B. O. .... Pure white.  
 1.21  
0.96  
 Nest, a few twigs in low trees and bushes.
- 14 *Turtur Senegalensis*, ..... March, April, May, June, Augt., Sept., ... 2. P. O. = B. O. .... Pure white.  
 1.11 1.20  
0.92 0.90  
 Nest, a few twigs in low trees and bushes.
- 15 *Turtur humilis*, ..... April, May, June, Augt., 2. P. O. = B. O. .... Pure white.  
 0.93 1.02  
0.74 0.76  
 Nest, a few twigs in low bushes or trees.
- 16 *Pavo cristatus*, ..... June, July, ..... O. P. = B. O. P. .... Clear brownish cream colour.  
 2.66 2.50  
1.88 2.00  
 Nest, a mere hole in the ground in difficult stony places in the hills.
- Mor manjur*.

- 17 *Perdix Ponteceriana*, .....April 1st, May, Sept.,... 9. P. = O. P. .... Clear cream colour.  
 A little grass in a hole in the ground,  
 usually sheltered by a bush : or in  
 clumps of grass.  
 J'ita.  $\frac{1.29}{1.03}$
- 18 *Ammoperdix Bonhami*, .....April, May, June, ..... 12. P. = O. P. .... Clear cream colour.  
 A slight hollow among stones in the  
 hills.  
 Susi.  $\frac{1.40}{1.00}$
- 19 *Caccabis chakor*, .....April, May, ..... 12. O. P. = B. O. P. .... Yellowish white or brownish cream  
 colour, faintly ringed and spotted  
 with tan colour.  
 Chakor. A few leaves on ground under  
 bushes.
- 20 *Turnix Sykesii*? .....August 3rd, ..... 5. B. P. .... Pale gray closely freckled with dirty  
 yellowish ochre, with a few dots  
 of neutral, and blotched with deep  
 reddish brown or blackish umber.  
 Bailer (Taigoor.) Nest, a little grass hemp yarn, and  
 a few hairs on ground in field of  
 Bájra.
- 21 *Palæornis torquatus*, .....May 3rd, ..... 4. R. O. P. .... Pure white.  
 Nest none, eggs laid in holes, in  
 walls, trees and steep banks in  
 company with No. 12.  
 Totha (generic.)  $\frac{1.25}{1.05}$
- 22 *Palæornis cæruleocephala*, ... March 3rd, ..... 4.5 B. P. .... Pure white.  
 Eggs laid in holes in trees.  
 $\frac{1.13 \quad 1.17}{0.95 \quad 0.93}$

- 23 *Pycnonotus leucotis*, ..... May, June, July, ..... 4. O. P. .... White, much dotted with claret red.  
*Bulbul* (generic.) ..... 0.91 Nest, a neat cup of vegetable fibres  
in bushes. .... 0.64
- 24 *Pycnonotus Bengalensis*, ... May, June, July, ..... 4. B. O. P. .... Deep pink, blotched with deep claret  
red. .... 0.87  
Nest similar to No. 23. .... 0.62
- 25 *Acridotheres tristis*, ..... June, ..... 5. O. P. .... Pale bluish green.  
Maina. .... 1.20 Nest roots and other rubbish, in  
trees or holes in house, Varan-  
das, &c. .... 0.85
- 26 *Acridotheres gingianus*, ..... May 3rd, ..... 7.8 O. P. .... Clear greenish blue.  
Gang-maina. .... 1.08 Nest, a hole in the sand at the end  
of a gallery run into a steep bank,  
many nests in company. .... 0.81
- 27 *Cypselus affinis*, ..... April, May, June, Augt.,  
Sept., ..... O. P. .... Pure white.  
Ababil (generic.) ..... 0.90 Nest, light straw and feathers  
strongly agglutinated to rafters  
of houses, nests in colonies and  
often united together, size varies  
much, some have long necks  
others are mere saucers without  
any. Second nests are less care-  
fully built. The inside is not  
lined, and feels like coarse card-  
board. .... 0.56



|    |                                      |                                                 |                                                             |                                                                                                                                                                                                                |
|----|--------------------------------------|-------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28 | <i>Hirundo Sinensis</i> , .....      | February 3rd, .....                             | 4. O. P. ....                                               | Pure white.<br>Nest of grass lined with feathers,<br>placed at the end of a gallery in<br>a steep river bank.                                                                                                  |
|    |                                      |                                                 | $\frac{0.62}{0.48}$                                         |                                                                                                                                                                                                                |
| 29 | <i>Oriolus kundoo</i> , .....        | May 2nd, .....                                  | 4. O. P. ....                                               | Pure white with a few black spots.<br>Nest a neat cup of woven grass,<br>attached by the side to a bough<br>of some fruit tree.                                                                                |
|    |                                      |                                                 | $\frac{1.17}{0.81}$ $\frac{1.23}{0.75}$                     |                                                                                                                                                                                                                |
| 30 | <i>Dicrurus macrocerus</i> , .....   | May, June, .....                                | 4. O. P. ....                                               | Dirty reddish white spotted with<br>red; colours vary; in some the<br>spots seem to have run, as ink<br>does on damp paper.                                                                                    |
|    | <i>Jápul kalchit</i> .               |                                                 | $\frac{1.08}{0.73}$                                         | Nest a neat shallow cup of roots<br>and stalks in bushes.                                                                                                                                                      |
| 31 | <i>Passer domesticus</i> , .....     | February, March, April,<br>May, June, July, ... | 5-6. O. P. ....                                             | White spotted and blotched with<br>brownish black or brownish<br>white blotched with deep brown;<br>colour varies much.                                                                                        |
|    | <i>Gureia</i> .                      |                                                 | $\frac{0.85}{0.65}$ $\frac{0.82}{0.61}$                     | Nest a loose structure of grass and<br>feathers, in trees or houses.                                                                                                                                           |
| 32 | <i>Malacocercus caudatus</i> , ..... | March, April, May,<br>June, August, .....       | 4.5 O. P. L. O. P. ....                                     | Clear greenish blue.<br>Nest a loose but deep cup of grass<br>and twigs in bushes in jungle or<br>garden. The first size is com-<br>mon, the second and third mea-<br>surements were from eggs of one<br>nest. |
|    | Sór.                                 |                                                 | $\frac{0.84}{0.66}$ $\frac{1.04}{0.60}$ $\frac{0.75}{0.55}$ |                                                                                                                                                                                                                |

33 *Oxylophus melanoleucus*, ...August,  
(Identified by Mr. Blyth.)

|               |                                    |
|---------------|------------------------------------|
| 1. B. O. .... | Deep greenish blue.                |
| <u>0.91</u>   | This evidently parasitical egg was |
| <u>0.81</u>   | taken from the nest of No. 32,     |
|               | containing four ordinary eggs      |
|               | which it closely resembles in      |
|               | colour, though its form indicates  |
|               | its parasitical character.         |

34 *Galerida cristata*,  
Chandul.

|                |               |                                       |
|----------------|---------------|---------------------------------------|
| March 4th, ... | 4. O. P. .... | Yellowish white uniformly freckled,   |
|                | <u>0.88</u>   | with grayish yellow and neutral.      |
|                | <u>0.66</u>   | Nest, a little grass in a hole in the |
|                | <u>0.82</u>   | ground.                               |
|                | <u>0.64</u>   |                                       |

35 *Thamnolia Cambaicusis*,  
Jimma (generic.)

|                |                  |                                       |
|----------------|------------------|---------------------------------------|
| April 2nd, ... | 4. P. O. P. .... | Greenish white ringed and spotted     |
|                | <u>0.79</u>      | with pale reddish and a little        |
|                | <u>0.60</u>      | neutral.                              |
|                |                  | Nest, loose grass and bits of snake's |
|                |                  | skin in holes in the sides of         |
|                |                  | Nullas.                               |

36 *Nectarina asiatica*, ...May 4th, ...

|             |                                    |
|-------------|------------------------------------|
| O. P. ....  | Grayish white freckled and ringed  |
| <u>0.66</u> | with cineritious gray.             |
| <u>0.47</u> | Nest, a neat purse of vegetable    |
|             | fibre and down suspended from      |
|             | some small bough and masked in     |
|             | front by a few dead leaves loosely |
|             | attached by silk threads.          |

|    |                                 |                                           |                                      |
|----|---------------------------------|-------------------------------------------|--------------------------------------|
| 37 | <i>Munia Malabarica</i> , ..... | May, August, Septem-12. 13. = (25.) ..... | Pure white.                          |
|    |                                 | ber, October, Decem-O. P. 0.59            | Two pairs of birds frequently if not |
|    |                                 | ber, .....                                | usually are employed in the con-     |
|    |                                 |                                           | struction of one nest in which       |
|    |                                 |                                           | the two hens consecutively lay—      |
|    |                                 |                                           | so the same nest has sometimes       |
|    |                                 |                                           | 25 eggs in it, in different stages   |
|    |                                 |                                           | of incubation—nest often clumsy      |

and hastily made—but usually a neat domed structure of fine grass with one opening, sometimes prolonged into a short deflected neck partially closed by the elasticity of the long spikes of grass forming it; sometimes the nest is a simple platform of grass, open at each end, but the grass ends curved over to meet at the top, usually placed in thorny bushes, often very conspicuously and close to roads. It is much to be doubted if the eggs found occasionally in October and December, are hatched.

|   |                                      |                                               |                                                                                                              |
|---|--------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 1 | <i>Podiceps Philippensis</i> , ..... | August, September, ... 5. P. O. L. P. O. .... | Pure white; when recently laid, green is soon soiled brown in the nest.                                      |
|   | <i>Pandubi</i> .                     |                                               | Nest, a few weeds heaped on the rank vegetation of jheels, but floating, and usually several nests together. |
|   |                                      |                                               | Pinkish cream or gray spotted and slightly ringed with deep red brown. [nest.                                |

|   |                                     |                   |                    |
|---|-------------------------------------|-------------------|--------------------|
| 2 | <i>Gallinula chloropus</i> , .....  | August 4th, ..... | O. P. ....         |
|   |                                     |                   | 1.62               |
|   |                                     |                   | 1.15               |
| 3 | <i>Sarciophorus lilobus</i> , ..... | May 2nd, .....    | 3. P. = O. P. .... |
|   |                                     |                   | 1.63               |
|   | <i>Jithiri</i> .                    |                   | 1.19               |

Nest as No. 1: eggs also stained by creamy yellow or stone colour, thickly spotted and blotched with blackish brown.

|                                              |                     |                                               |
|----------------------------------------------|---------------------|-----------------------------------------------|
| 4 <i>Ardeola leucoptera</i> , .....June 4th, | 5. 6. P. O. ....    | Pale green.<br>Nest of loose sticks in trees. |
| <i>Bogla</i> (generic).                      | 1.54<br><u>1.16</u> |                                               |

*Kashmir Notes.*

|                                                  |                                         |                                                                                                                                                            |
|--------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 <i>Tinunculus alaudanus</i> , .....April 3rd,  | 6. B. O. P. ....                        | Pale reddish brown freckled and<br>blotched with brownish red.<br>Nest, hole in sarai wall of Thánna<br>S. of Baranegala Sháhábád and<br>valley generally. |
| Shikra.                                          | 1.68 1.51<br><u>1.22 1.27</u>           |                                                                                                                                                            |
| 2 <i>Milvus</i> ? <i>Buteo</i> , .....April 4th, | 2. O. P. ....                           | Nest and eggs as in plains. (No. 6<br>ante.)                                                                                                               |
|                                                  | 2.10 2.40<br><u>1.80 1.77</u>           |                                                                                                                                                            |
| 3 <i>Corvus</i> , .....April 3rd,                | 4. O. P. ....                           | Green, spotted with brown, valley<br>generally.                                                                                                            |
| Small black Hill Crow.                           | 1.70 1.60<br><u>1.20 1.25</u>           | Nest placed in "chinar" and diffi-<br>cult trees.                                                                                                          |
| 4 <i>Corvus monedula</i> , .....May 1st,         | 4. 5. 6. O. P. L. O. P.                 | Pale clear bluish green : dotted and<br>spotted with brownish black.<br>Valley generally. In holes of rocks,<br>beneath roofs, and in tall trees.          |
|                                                  | 1.26 1.45 1.60<br><u>0.99 1.00 1.00</u> |                                                                                                                                                            |
| 5 <i>Sturnus vulgaris</i> , .....May 2nd, 3rd,   | O. P. ....                              | Pale clear bluish green.                                                                                                                                   |
| Jilgiri.                                         | 1.15<br><u>0.85</u>                     | Valley generally; in holes of bridges,<br>tall trees, &c. in company with<br>No. 4.                                                                        |



|    |                                     |                                                |                                                                                                  |
|----|-------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 6  | <i>Acridotheres tristis</i> , ..... | April 3rd, .....                               | Nest and eggs as in plains. Rajauri and lower hills generally.                                   |
| 7  | <i>Caccabis chukor</i> , .....      | May 3rd, .....                                 | Nasmána on the Chandra-bága: eggs as ante, No. 19.                                               |
| 8  | <i>Pycnonotus leucotis</i> , .....  | April 4th, at Bhimba,<br>May 2nd at Islamabad. | Nest and eggs as in plains; ante No. 23.                                                         |
| 9  | <i>Hirundo rustica</i> ,* .....     | May 2nd, .....                                 | Pure white spotted with bright reddish brown. Valley generally.                                  |
|    |                                     |                                                | Nest under eaves, outside coarse straw cemented with mud, inside fine straw lined with feathers. |
|    |                                     |                                                | 4. L. O. P. ....                                                                                 |
|    |                                     |                                                | 0.83                                                                                             |
|    |                                     |                                                | <hr/> 0.53                                                                                       |
| 10 | <i>Budytio citreola</i> , .....     | May 3rd, .....                                 | Pale gray thickly dotted and ringed with grayish brown and grayish neutral mingled together.     |
|    |                                     |                                                | 0.95                                                                                             |
|    |                                     |                                                | <hr/> 0.70                                                                                       |
|    |                                     |                                                | A depression in soft earth beneath a rock near Báragari. Valley generally.                       |
| 1  | <i>Anas Boschas</i> , .....         | May 1st, .....                                 | Dirty white with a tinge of yellowish green near Supeia valley of Cashmir.                       |
|    |                                     |                                                | L. O. P. ....                                                                                    |
|    |                                     |                                                | 2.27                                                                                             |
|    |                                     |                                                | <hr/> 1.55                                                                                       |
| 2  | * <i>Podiceps cristatus</i> ? ..... | May 2nd, .....                                 | Pure white; when recently laid pale green. Wala lake.                                            |
|    |                                     |                                                | Nest, a heap of weeds floating on the surface of the water, but connected to reeds, &c.          |
|    |                                     |                                                | 5. P. O. ....                                                                                    |
|    |                                     |                                                | 2.35                                                                                             |
|    |                                     |                                                | <hr/> 1.51                                                                                       |

|   |                                               |                       |                                                                                                                                                                                 |
|---|-----------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | <i>Podiceps Philippiensis</i> , .....May 2nd, | .....5. P. O. ....    | Pure white. Wala lake.<br>Nest as No. 2.                                                                                                                                        |
|   |                                               | 1.40                  |                                                                                                                                                                                 |
|   |                                               | <u>1.00</u>           |                                                                                                                                                                                 |
| 4 | <i>Fulica atra</i> , .....May 2nd,            | .....8. L. O. P. .... | Pale brownish gray, dotted with<br>reddish black. Wala lake.<br>Nest, pieces of dried reeds about<br>6 inches long, piled together<br>among reeds and floating on the<br>water. |
|   |                                               | 2.10                  |                                                                                                                                                                                 |
|   |                                               | <u>1.40</u>           |                                                                                                                                                                                 |
| 5 | <i>Gallinula chloropus</i> , .....May 2nd,    | .....O. P. ....       | Pale gray or reddish gray dotted<br>and spotted with deep reddish<br>brown.<br>Nest, a few weeds heaped on the<br>water among reeds.                                            |
|   |                                               | 1.70 1.57             |                                                                                                                                                                                 |
|   |                                               | <u>1.26 1.11</u>      |                                                                                                                                                                                 |

*On the Peculiarities of the Gáthá Dialect.*—By Bábú RÁJENDRALÁL MITTRA.

It is an established truth in the science of Philology that languages change in course of time, even when uninfluenced by the intrusion of foreign elements. This process of mutation is most clearly exemplified in the transition of the Latin into the modern dialects of Italy, which have assumed their present forms by a series of phonetic changes from the influence of the *genius loci* without any such heterogeneous admixture as are met with in the languages of England and France. In India, the Sanskrita has undergone the same course of transformation, and like the Latin has produced a number of Prakrita or vernacular dialects by a process of curtailment of inflexion and euphony to which the Romance and Germanic languages of Europe offer the nearest parallel.

Of the dialects which have proceeded from the Sanskrita, the Páli and the Mágadhi have hitherto been supposed to bear the closest resemblance to their parent, but the discovery of the Sanskrita Buddhist literature of Nepal (thanks to the untiring zeal of the learned Mr. Hodgson) has brought to our knowledge a new dialect bearing a still closer affinity to the classic language of the East, than either of the former. Nepalese chroniclers have named it Gáthá, (ballad) probably, from its having been principally used by the scalds and bards of mediæval India. For nearly a similar reason the Balenese style the language of their poets, the *Káwi* or poetical, and the language of the Vedas is called *Chhandas* (metrical), whence by a well-known euphonic law, we have the *Zend* of the old Persians.

M. Burnouf, the only European scholar who has noticed the existence of this dialect, describes it to be “a barbarous Sanskrita in which the forms of all ages, Sanskrita, Páli and Prakrita appear to be confounded.”\* It differs from the Sanskrita more in its neglect of the grammatical rules of the latter than from any inherent peculiarity of its own. The niceties of the Sanskrita forms of declension and conjugation find but a very in-

\* *l'Histoire du Bouddhisme*, p. 104.

different attention from the Gáthá versifier; he uses or rejects the usual case-affixes according to the exigencies of his metre with as much veneration for the rules of Pánini as the West Indian Negro has for those of Lindley Murray; indeed, the best illustration that can be given of the relation which exists between the Sanskrita, the Gáthá and the Páli, would be extracts from the literature of the Negroes. The following paragraph from a Negro version of the New Testament by some Moravian Missionaries\* bears exactly the same relation to the English of the *Times* newspaper as the Páli does to the Sanskrita of the Puránas, and the affinity of its translation to the same standard, may be very appropriately likened to that of the Gáthá to the bráhmanic language of the gods.

“Drie deh na bakka, dem holi wan bruiloft na Cana na Galilee, en mamma va Jesus been ce dapeh. 2, Ma dem ben kali Jesus nanga him disciple toe va kom na da bruiloft. 3, En tah evieni kaba, mamma va Jesus takki na him, dem no habi wieni morro. 4, Jesus takki na him nu mamma noe worko me habi nanga joe. Tem va mi noben kom jette.”

*Translation.*—“Three days after back, them hold one marriage in Cana of Galilee, and mamma of Jesus been there. 2. But them been call Jesus with him disciples to come to that marriage. 3. And when wine end, mamma of Jesus talk to him: Them no have wine more. 4. Jesus talk to him me mamma how work me have with you, time of me no come yet.”

The Gáthá exists only in a versified form, and is to be met with in that class of Buddhist writings called the *Mahávaipulya* or the “highly developed” sutras. It occurs generally at the end and often in the middle, but never at the commencement, of a chapter, and contains a poetical abstract of the subject described in the prose portion of the works. The latter is written in pure Sanskrita, and comprises a highly amplified version of the subject matter, and often adverts to circumstances unnoticed in the former. In its extreme verbosity, the prose bears a strong resemblance to the Tantras, a class of works which was introduced into India between the 4th and the 7th centuries of the Christian era, and appears to be the production of men who undertook to write voluminous works with insufficient materials.

\* Apud Quarterly Review, No 76.



The Gáthá is written in a variety of metres from the facile octosyllabic *anushtup*, to the most complicated *Sárdulavikrīḍita*, which includes 19 syllables to the foot, and is remarkable for the simplicity of its style, and the easy natural flow of its language. Its peculiarities are those of a language in a state of transition; it professes to be Sanskrit, and yet does not conform to its rules. In it we find the old forms of the Sanskrit grammar gradually losing their expressive power, and prepositions and periphrastic expressions supplying their places, and time-hallowed verbs and conjugations juxtaposed to vulgar slangs and uncouth provincialisms. At one place, orthography is sacrificed for the sake of prosody and a word of a single short syllable is inflated into one of three syllables, while at another the latter yields to the former and a molossus supplies the place of a pyrrhic or a tribrach. A spirit of economy pervades the whole, and syllables and words are retrenched and modified with an unsparing hand. In the *Lalita Vistara*, a work of the highly developed class, instances of these peculiarities occur in great profusion, and they may be generally referred to (A) exigencies of metre, (B) provincialisms, and (C) errors of syntax and prosody.

A. Of the changes which may be attributed to the exigencies of metre, prolongation, contraction and elision of vowels, elision of consonants, and the segregation of compound consonants and long vowels into their simple elements, appear to be the most frequent. We shall quote a few instances :

1st. Of the prolongation of vowels the following may be taken as examples. They are not so frequently met with, as contractions.

ना च for न च p. 260.\*

सो च for स च p. 292.

प्रयातो for प्रायानः p. 288.

रोदमान for रुदमान p. 288.

ते for ताः p. 293.

2nd. Of contractions of vowels, instances occur almost in every *śloka*. They are generally effected by the use of short for long vowels, and the substitution of i and u for é, ai, o and au. For example :

\* These instances are quoted from the edition of the *Lalita Vistara* now in course of publication in the *Bibliotheca Indica*.

यामि for यामे p. 291.

धरेन्ति for धारयन्ति p. 89.

द्रुमवर for द्रुमवरा: p. 89.

माथ for माया p. 91.

घण्ट for घण्टा p. 92.

पुजमेतां for पूजामेतां p. 93.

यथ for यथा

तथ for तथा

सद् for सदा

3rd. Elisions of vowels and consonants are also very frequent; they are effected principally with a view to economy and euphony. Final *ses* are invariably elided. Take for instance:

नभे for नभसि

अप्सरः for अप्सरसः p. 293.

सदार्चिक्खन्नि for सदार्चिषि खन्ने p. 201.

इम दृष्ट वर्यां for इमां दृष्ट्वा अवस्थां p. 229.

निश्चरो for निश्चचार p. 220.

प्रणिधेन्ति for प्रणिधायन्ति p. 93.

मना for मनसः

एन for एतेन p. 293.

4th. Of the division of long vowels and compound consonants into their short and simple elements, the following are instances of constant occurrence:

रान्तिथे for रात्र्या: or रात्र्याम् p. 291.

तुरियेभि for तुर्येभ्यः p. 220.

गिल्लानो for स्नानो p. 228.

इस्सि for स्त्री p. 291.

तुरिय for तूर्य p. 288.

अकिलान्ता for अज्ञान्तक p. 460.

This tendency to segregation of aspirated consonants, forms a principal characteristic of mediæval and modern Indian phonology. The Páli and the Prákrita owe their origin entirely to this cause. The Hindi and the Marhatti indulge in it to a large extent, and the Bengáli is not exempt from its influence. The process, however, of effecting this change is not uniform. In languages with a strong vocalic tendency, the sharpness of compound consonants is filed off by the elision of the first letter and the reduplication of the

second. Thus *abja* (lotus) is converted to *ajja*; *karma* (work) to *kam-ma*. In compounds of a liquid and an aspirated letter, the former is invariably elided without reference to its position, and accordingly “*padma*” [lotus] is changed to *pad-da*, “*sadma*” [house] into *sad-da*, and *haridrā* [turmeric] into *haliddā*. The Italian, which is by far the most vocalic of all European languages, has this tendency in a prominent degree. In it, the Latin *subjunctivus* passes into *saggiuntivo*, *perfectio* into *perfetto*, *absorbeo* into *assorbire*, &c. &c. In languages which abound in consonantal finals, compound consonants are segregated by the interposition of a vowel between them, the final vowel being occasionally elided; thus in the Hindi, the Sanskrita word “*marma*” [a joint] is, by the interposition of an *a* after the *r* and the elision of the final *a*, converted into *maram*; *dharam*, *karam* and *parab* are instances of the effect of the same rules. These rules, however, are not universal in their application, and exceptions are very frequent.

B. The provincialisms of the Gáthá include (α) neglect of gender, number and case, (β) abbreviations and omissions of declensions, (γ) corruption of pronouns, and (δ) new forms of conjugation.

α—Of the neglect of gender, number and case, the following may be taken as examples:

विशुद्धनिर्मलं for विशुद्धनिर्मलान् p. 292 (singular for plural).

बुद्धचेवं for बुद्धचेवाणि p. 292 (ditto).

तानपि for तावपि p. 291 (plural for dual).

आसनिना for आसनात् p. 177 (instrumental for ablative).

बोधिसुवट for बोधिसुवटात् p. 462 (objective for ablative).

ऊर्द्ध हस्ता for ऊर्द्धौ हस्तौ p. 324 (plural for dual).

केचिदेकपादे for केचिदेकपादेन p. 324 (locative for instrumental).

त्रिलोकं for त्रिलोकी p. 316 (neuter for feminine).

कारणां for कारणानि p. 325 (singular feminine for plural neuter).

नचत्राः for नचत्राणि p. 236 (masculine for neuter).

मुक्तहारं for मुक्ताहारः p. 237 (dative for nominative).

मञ्चकं for मञ्चकः p. 237 (ditto).

β—Under the head of abbreviations and omissions of declension, the most remarkable peculiarity appears to be the use of *उ* in the room of all flectional affixes. This helps in a great measure to give sweetness and variety to the style, but at the same time it contributes to render the meaning dubious, and the study of the Gáthá

a matter of great difficulty to those who have nothing but their knowledge of the Sanskrita grammar to help them. In the Páli and the Prákrita, the use of this occasional substitute is confined to the first person of the nominative singular. In the Braja Bhákhá, however, it has a much wider range. In the following verse, it is used both for the nominative and the dative, as well as an euphonic adjunct to verbs in the second person of the indicative:

मो ते कहा मसकरी करड ।

कुवचन बोले तुमहि मरड ।

पीपाके मन उपजे रोसु ।

भलो कहत कत लावे दोसु । (De Tassy's Chrestomathie Hindie, p. 79.)

The use of the *u* in the Gáthá, is made with much reserve and the regular inflections of the Sanskrit prevail. The locative *i* (इ) is not subject, as in the Sanskrita, to any change of form by association with a vowel. In the vocative a long *á* (आ) is the most approved case-affix. In some cases, however, inflections are altogether dropped.

γ—The following are the corruptions of pronouns that are frequently met with in the Lalita Vistara. They apparently lead the way to the formation of pronouns in the modern vernaculars.

मद्य for मम and मत्तः

तुभ्य for त्वय, त्वां, and तव

अय्य for एषः

ते for ता

कहिं for कुत्र and केन

δ—The new forms of conjugation observable in the Gáthá are attributable exclusively to corrupt pronunciation; they follow no fixed rule, and are the result of that natural tendency to abbreviation which in English originates “wont” from “will not” and “shant” from “shall not.” The following are a few examples:

याति for गच्छति

ददमि for ददामि

विवरो for न्यवरोणात्

निष्क्रमन्ति for निष्क्रामति

भोसि for भवसि

भोति for भवति

भोन्ति for भवन्ति

मुद्धि for अमुचन्



अजनेहि for माजनय  
 रमिष्यसि for रंस्यसे  
 आरुहि for आरोहत्  
 अरणौ or रणौ for अरणत्  
 उत्थि for उत्तिष्ठ  
 शृणुवन्ती for शृण्वन्ति  
 दद for ददस्व  
 शृणोहि for शृणु  
 प्रहेमि for पश्यामि  
 मुञ्चमो for अमुञ्च  
 भेषि for भविष्यामि-व-म-ति-तः अन्ति-सि थ-ःथ  
 परिकथ for परिकथय  
 न्यसी for निदधुः  
 शृणित्वा for श्रुत्वा  
 आरोहित्वा for अवरोह्य  
 स्मपयिषु for स्नापयामासुः  
 जहित्वा for हित्वा  
 बुद्धित्वा for बुद्ध्वा

It may be remarked that the corruptions above quoted are, in many instances, the precursors of forms adopted in other affiliated dialects. In Sanskrita the third person singular of the verb *to be* is *Bhavati*, which in the Gáthá changes to *Bhoti* by the conversion of the *v* into *o* and the elision of the *a* before and after it, (*Bhonti* in the plural and *Bhosi* in the second person singular) and thence we have *hoti*, *hosi* and *honti* in the Mágadhi; *Hae* and *Haen* in the Khariboli, and *áhe*, *ahet* and *ahes* in the Marhatti. In the Hindi, notwithstanding the reduplication of the root in *hotáhae*, the original form is still distinctly indicated. *S'unitvá* for *s'rutvá* is the first step to the formation of *s'unia* in Bengali, while *s'unohi* passes into *s'uno* with nothing but the elision of an inflexion, which in the original Sanskrita, is oftener omitted than retained.

C. In the collocation of words and phrases the Gáthá strictly follows the rules of Sanskrita Syntax, but in the formation of compound terms it admits of many licenses highly offensive to the canons of Pánini and Vopa deva. They seem, however, to be the consequence of haste and inattention, and are not referible to any dialectic peculiarity. The same may be said of the errors of Prosody which, notwithstanding the anxiety of the Gáthá versifier

to avoid false metre even at the expense of etymology, prevail to a great extent in their compositions. In this respect the Gáthá may be likened to the Kabits of the Bháts of modern India, who in their attempt to combine freedom of elocution, harmony and grammar in their improvisations—sadly offends against all three.

Of the origin of the Gáthá, nothing appears to be known for certain M. Burnouf is inclined to attribute it to ignorance ; he says :—

“This fact (the difference of language of the different parts of the Vaipulya S'utras) indicates in the clearest manner that there was another digest (of the Buddhist literature prepared, besides those of the three convocations) and it agrees with the development of the poetical pieces in which these impurities occur, in shewing that those pieces do not proceed from the same hand to which the simple Sutras owe their origin. There is nothing in the books characterised by this difference of language, which throws the smallest light on its origin. Are we to look on this as the use of a popular style which may have developed itself subsequent to the preaching of Sákya, and which would thus be intermediate between the regular Sanskrita and the Páli,—a dialect entirely derived and manifestly posterior to the Sanskrita ? or should we rather regard it as the crude composition of writers to whom the Sanskrita was no longer familiar, and who endeavoured to write in the learned language, they ill understood, with the freedom which is imparted by the habitual use of a popular but imperfectly determined dialect ? It will be for history to decide which of these two solutions is correct ; to my mind the second appears to be the more probable one, but direct evidence being wanting, we are reduced to the inductions furnished by the very few facts as yet known. Now, these facts are not all to be found in the Nepalese collection ; it is indispensably necessary in order to understand the question in all its bearings to consult for an instant the Singalese collection and the traditions of the Buddhists of the South. What we thence learn is, that the sacred texts are there written in Páli ; that is to say in a dialect derived immediately from the learned idiom of the Bráhmans, and which differs very little from the dialect which is found on the most ancient Buddhist monuments in India. Is it in this dialect that the poetical portions of the great Sutras are composed ? By no means ; the style of these portions is an indescribable

melange in which incorrect Sanskrit bristles with forms of which some are entirely Páli and others popular in the most general sense of the term. There is no geographical name to bestow upon a language of this kind; but it is at the same time intelligible how such a jargon<sup>\*</sup> may have been produced in places where the Sanskrita was not studied systematically, and in the midst of populations which had never spoken it or had known only the dialects derived from branches more or less remote from the primitive stock. I incline then to the belief that this part of the great Sutras must have been written out of India, or, to express myself more precisely, in countries situated on this (western) side of the Indus, or in Cashmir, for example; countries where the learned language of Bráhmaism and Buddhism would be cultivated with less success than in Central India. It appears to me almost impossible that the jargon of these poems, could have been produced in an epoch when Buddhism flourished in Hindustán. There, in fact, the priests had no other choice but between these two idioms; either the Sanskrita, i. e. the language which prevails in the compositions collected in Nepal, or the Páli, that is the dialect which is found on the ancient Buddhist inscriptions of India, and which has been adopted by the Buddhists of Ceylon.”\*

This opinion, we venture to think, is founded on a mistaken estimate of Sanskrita style. The poetry of the *Gáthá* has much artistic elegance which at once indicates that it is not the composition of men, who were ignorant of the first principles of grammar. Its authors display a great deal of learning, and discuss the subtlest questions of logic and metaphysics with much tact and ability, and it is difficult to conceive that men who were perfectly familiar with the most intricate forms of Sanskrita logic; who have expressed the most abstruse metaphysical ideas in precise and often in beautiful language; who composed with ease and elegance in *Arya*, *Totaka* and other difficult measures, were unacquainted with the rudiments of the language in which they wrote, and even unable to conjugate the verb to be, in all its forms. This difficulty is greatly enhanced, when we bear in mind that the prose portion of the *Vaipulya* Sutras is written in perfectly pure Sanskrita, and has no trace whatever of the provincialisms and popular forms so abundant in the poetry. If these

\* *l'Histoire du Buddhisme Indien*, p. 105.



Sutras be the productions of men beyond the Indus imperfectly acquainted with the Sanskrita, how happens one portion of them to be so perfect in every respect, while the other is so impure? What could have been the object of writing the same subject twice over in the same work, once in pure prose and then in incorrect poetry?

It might be supposed—what is most likely the case—that the prose and the poetry are the productions of two different ages; but the question would then arise, how came they to be associated together? What could have induced the authors of the prose portions to insert in their works, the incorrect productions of Trans-Indus origin? Nothing but a sense of the truthfulness and authenticity of those narratives, could have led to their adoption. But how is it likely to be supposed that the most authentic account of S'ákya within three hundred years after his death, was to be had only in countries hundreds of miles away from the place of his birth, and the field of his preachings? The great Sutras are supposed to have been compiled about the time of the third convocation, (309 B. C.) when it is not at all likely that the sages of Central India would have gone to Cashmere in search of data, which could be best gathered at their own threshold.

The more reasonable conjecture appears to be that the Gáthá is the production of bards, who were contemporaries or immediate successors of S'ákya, who recounted to the devout congregations of the prophet of Magadha, the sayings and doings of their great teacher, in popular and easy flowing verses, which in course of time came to be regarded as the most authentic source of all information connected with the founder of Buddhism. The high estimation in which the ballads and improvisations of bards are held in India and particularly in the Buddhist writings, favours this supposition; and the circumstance that the poetical portions are generally introduced in corroboration of the narrative of the prose, with the words: तत्रेदमुच्यते, “Thereof this may be said,” affords a strong presumptive evidence.

According to the *Mahawanso*, the Buddhist scriptures were chaunted chapter after chapter as they were compiled by the Theros of the first convocation. This could scarcely have been possible had not the Sutras been in verse, and that they were in verse and in



the Gáthá form too, we learn in another part of the same work (Chap. 37th).\*

The Hon'ble Mr. Turnour is of opinion that the religion of S'ákya was originally "preached and spread among the people" in the Páli language, and yet in his edition of the Maháwanso he has shewn that Mahindo son of Asoka translated the Buddhist scriptures into Cingalese from the digest prepared at the convocation held in the 27th year of his father's reign, and that from that recension the Páli version was got up in the middle of the fifth century (459 @ 477 A. C.) admitting thereby that the language used at the third convocation was other than Páli, for if Asoka's edition had been in that language a new edition from the Cingalese recension would have been quite uncalled for, if not useless. As a collateral evidence it may be noticed that the history of S'ákya as recorded in the Burmese "*Malalengara Wattoo*"† which is a faithful translation of the Pali *Lalita Vistará*, bears a closer approximation to the narrative of the Gáthá than to that of the prose of the great Sutras, shewing the former to be a more authentic, at least a more generally received, version than the latter.

The language of the Gáthá is believed, by M. Burnouf, to be intermediate between the Páli and the pure Sanskrita. Now, as the Páli was the vernacular language of India from Cuttack to Kapur-dagiri within three hundred years after the death of S'ákya, it would not be unreasonable to suppose that the Gáthá which preceded it was the dialect of the million at the time of S'ákya's advent. If our conjecture in this respect be right it would follow that the Sanskrita passed into the Gáthá six hundred years before the Christian era; that three hundred years subsequently it changed into the Páli and that thence in two hundred years more, preceded the Prákrita and its sister dialects the Sauraseni, the Drávidi and the Pañcháli, which in their turn formed the present vernacular dialects of India.

\* When Buddhoghoso offered to undertake the translation of the Cingalese version of the Pitakattayan into Páli, the priesthood of the Maháviharo at Anurádhápuro "for the purpose of testing his qualifications, gave him only two GA'THA's, saying; hence prove thy qualification; having satisfied ourselves on this point, we will then let thee have all the books." Ante Vol. VI. p. 508.

† For a translation of this work vide *Journal American Oriental Society*, Vol. III. p. 1 et seq.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,

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FOR SEPTEMBER, 1854.

At an ordinary general meeting of the Society held on the 6th instant, at half-past 8 P. M.

The Hon'ble Sir J. W. COLVILLE, Kt. President, in the chair.

The proceedings of the last month were read and confirmed, and the accounts and vouchers for the months of June and July laid on the table.

Presentations were received—

1. From the Government of Bengal through Mr. Under-Secretary Young, for the use of the Museum of Economic Geology, Maps of South Behar, Hooghly and Bhaugulpore.

2. From Capt. Thuillier, maps of the same districts for the use of the Library of the Society.

3. From J. P. Collier, Esq., two copies of a work on the Languages of the Seat of War, by Dr. Max Müller.

4. From Mr. W. Theobald, seventeen Indo-Scythian copper coins.

5. From R. M. Stephenson, Esq. through Lieut.-Col. Baker, Specimens of Iron Ore from Midnapore and of Sulphate of Iron from Assam. Of the latter Mr. Wagentrieber writes: "The quantity now sent cannot be taken as a criterion of what it would actually cost if collected in larger quantities, and regularly, but the expense attending the six maunds and twenty-three seers was Rs. 17, *on board* the Flat or at the rate of Rs. 2-9-4; it could however be delivered on the banks of the Berhampooter at a much lower rate than that."

6. From the Society of Antiquaries, through J. Akermann, Esq. Secretary, *Archæologia* Vol. XXXV. p. 2, and *Proceedings* Nos. 37—40.

R. Spankie, Esq., C. S. duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

W. Muir, Esq. C. S. was named for ballot at the next meeting ; proposed by the Hon'ble J. R. Colvin and seconded by the President.

Communications were received—

1. From Dr. E. Balfour, in charge of the Government Central Museum at Madras, forwarding a memorandum regarding the forests and woods of Southern India, prepared with a view to procuring information from the various districts, for a report to be made to the Madras Government on the 31st December, 1854.

2. From the Assistant Secretary to the Government, N. W. Provinces, enclosing copy of a Meteorological Register kept at the Secretariat office at Agra for the month of July last.

3. From Bábu Rádhánáth Sikdár, enclosing an Abstract of the results of the hourly Meteorological Observations taken at the Surveyor General's Office, in the month of May, 1854.

4. From Capt. E. T. Dalton, submitting a paper entitled "Notes on Assam Temple Ruins."

5. From the same, enclosing facsimiles and engravings of silver coins found at Gowhatty. The coins are of Shumsoodeen, Ilyas, Sekunder Shah, Gyasoodeen, Azim Shah and Mohamed Shah of the early Patan Dynasty. "They were found" says Capt. D. "full fifteen feet below the surface. The fortunate discoverer picked up a great many more than he made over to me, but it is rather curious that there should be such a variety in so small a collection."

6. From Prof. F. E. Hall, Benares, a paper entitled "a Passage in the life of Válmiki."

7. From W. Muir, Esq., Secretary to the N. W. Government, announcing that the Lieut.-Governor had sanctioned an expenditure of Rs. 500 for prosecuting the excavations of Sárnáth.

The Librarian and the Curator of the Zoological department submitted their usual monthly reports.

After the close of the regular business of the evening, Mr. Oldham briefly described the geological structure of the Sub-Himalayan hills, south of Darjiling; of the Khasia hills; and of the Rajmahal hills.

South of Darjiling, forming the lower portion of the great range of the outer Himalayah, occurs a group of sandstones, hard greenish coloured clunchy clays, and a few beds of shales, or laminated clays, forming together one continuous formation, attaining a stratigraphical thickness of upwards of 4000 feet. These all dip at high angles ( $40^{\circ}$  to  $70^{\circ}$ ) towards the north and north by west; or towards the hills. Their actual junction with the great mass of the gneissose, micaceous and quartzose metamorphic rock of which the higher masses of the hills are composed, was not traced in the neighbourhood of the Teesta; but their connection can be seen more to the west, where these sandstones are brought into contact with the metamorphic rocks by a great fault which bears nearly east and west.

In these sandstones, occur many imbedded stems of trees often of large size, frequently much worn and deprived of their bark and branches, but occasionally with the bark perfectly preserved and mineralized into a brilliant jet; the mass or central part of the stem being replaced by siliceous matter. In the bed of shales associated with the sandstones, occur numerous leaves of dicotyledonous trees, in all cases detached, and often much worm-eaten and decayed, but in general aspect of a very recent or modern character. Near the river Teesta, I did not find myself any remains of animals, nor did I hear on enquiry from the natives that such had ever been found. Dr. J. Hooker in his most interesting Journals mentions that he found in the continuation of these same rocks, a little further to the westward, what he thought was the shaft of a bone, and also some very imperfect vegetable remains, which he referred to *Vertebraria*. The correctness of the latter reference, I am inclined to doubt. After a careful search, I could myself find nothing of the kind, although numerous vegetable remains were met with; and I am tolerably certain that no trace of this remarkable genus *Vertebraria* is to be met with there.

These rocks extend into Bhotan on the east, and stretch away to the west also, but their limits in either direction are unknown. So far as they have been traced, they maintain the same general direction and dip.

The whole thickness of these rocks (more than 400 feet) consists of perfectly conformable beds, following in regular sequence, and containing identically similar plants in the uppermost as well as in the lowest beds of the group. They constitute therefore one great formation, the upper inferior limits of which are in this district unseen; and which from the mineral character of the rocks, from the imbedded remains of plants, and from their general aspect and arrangement, I would refer to the same epoch, as the great Sewalik group of the N. W. Provinces.

Of these sandstones, several small detached patches occur far within the hills, as in the valley of the Rungeet near Oushok, &c. &c., a fact of great



interest in the history of the formation of these hills. Dr. Hooker was not fortunate enough to have met with any of these, and speculates on the absence of any traces of these rocks.

Associated with this group of rocks, occur the deposits of coal which have been stated to occur in this district. There does not, however, appear to be a sound prospect of the discovery of any seam or bed of coal, sufficient in quantity to form a useful source of supply. In the Sewalik hills to the north-west, beds of lignite and of coal have also been found; but all the analogies of the rocks are against the supposition that such small beds will prove continuous, or large.

Passing now to the Khasia hills, the geological structure is very different. These hills rise from the great flat of the plains almost like a perpendicular wall of rocks, of which the greater portion is composed of sandstones of various tints, often calcareous and ferruginous, all associated with nummulitic limestones. The geological age of these rocks is well marked by this latter deposit, above and immediately in connection with which, occurs the coal of Cherra Poonji. There are no well marked traces of the newer rocks, above the nummulitic group, at Cherra Poonji, while this group rests immediately upon the micaceous, and gneissose metamorphic rocks below. All the known beds of coal in this district, occur in this series of rocks, which must be referred to the older tertiary epoch.

Passing now to the Rajmahal hills we find there resting distinctly and without any other intervening beds, on the metamorphic gneiss and schists of the plains of Bengal, a series of sandstones and shales with coal of a very different character from either of the group above alluded to. The connection of these beds with the great coal-yielding group of Ranigunj, and of the Burdwan coal field is perfectly established not only by the similarity of mineral character and of imbedded fossils, but also by the occurrence, at intervals within the intervening space, of patches of the same rocks, now detached and left as monuments of the vast denudation that has taken place, and of the original continuity of the rocks.

In the Damoodah coal-field it is well known that these rocks are cut up by numerous trappean dykes, but in the Rajmahal hills, the exhibition of volcanic forces has been on an infinitely larger scale. There we find great sheets of lava poured out over these sandstone shales: and this flow of igneous matter again covered up by other mechanically deposited beds, containing fossil remains similar to those in the beds beneath: And this is repeated several times. In all these cases, the uppermost beds of the mechanical rocks have been greatly altered, indurated and baked by the contact of the great mass of molten matter above: while on the several flows of the trappean character, the bedded rocks rests quite unchanged, and in several

instances the lower beds are partially made up of the disintegrated particles of the trap itself, mechanically re-arranged. The evidence is quite conclusive that there have been successive flows of matter in a state of fusion, during a long continued period, during the intervals of which mechanical deposits of sand and mud, often highly charged with vegetable remains took place.

These remains of plants are often remarkably well preserved, and occur so associated, that we must consider the whole series of beds, notwithstanding its interruption by the intercalation of the great masses of foreign matter, as forming one group or formation belonging, generally, to the same geological epoch as the coal-bearing rocks of the Ranigunj district.

The true age of these rocks is one of the most interesting questions of Indian Geology; and anything tending to throw light on it, is of great geological interest. Unfortunately in the Bengal coal-field no animal remains have as yet been found to aid in its solution. And no true or well defined horizon or datum line has been established from which the position of these rocks in the general series can be ascertained. I have already, in a previous number of this Journal, expressed my own opinion on this question; but it may be as well to point out the state of the case more fully.

In the coal-fields of India, numerous remains of fossil plants are found referable to genera, which to European geologists are known only to occur in rocks of a more recent date than the true carboniferous epoch. Associated with these are other genera not hitherto found at all in European rocks, but occurring plentifully in this country, and also in Australia. Now it is well known to every geologist, that the remains of plants alone furnish exceedingly poor evidence on which to base any conclusions with regard to the age of the rocks in which they occur. And this being the case, it is important to find, if possible, fossils belonging to the animal kingdom in connexion with them. Now in Australia, associated with beds containing fossil plants specifically identical with those found in the Indian coal-fields, occur other beds rich in animal remains, of a well marked type, which type represents a period (geological) corresponding to the lower carboniferous group of Europe. It was at first supposed that the beds containing the fossil plants occurred above, and formed a distinct group from the shelly beds; but the observation of all the most trustworthy witnesses negatives this. And in Australia, so far as our present evidence goes, it must, I think be conceded, that the same fossil plants, which in India characterize the coal-yielding beds, occur associated with abundant remains of shells, which must be considered of the carboniferous epoch of European geology. But the question is by no means so easily solved: for passing into Western India, we find associated with identically the same plants, as occur with those

found in the coal-yielding beds of Bengal, numerous remains of shells, &c. which are undoubtedly representatives of the oolitic period (Ammonites, &c.) The evidence here also would seem clear and the statements of Captain Grant in his description of Cutch, would lead us to refer the coal-yielding beds of that district containing *Ptilophylla*, &c. to the *oolitic* group. Taking therefore, the analogy of the nearer country, and coupling this with the general analogy, of the fossil plants found in these beds, I am disposed to think that we must *provisionally* consider these coal-bearing rocks of Bengal, as belonging rather to the mesozoic period, than to the palæozoic.

I have stated the difficulties of this question more fully, than may appear needful, because in some recent papers on the geology of India, it has been assumed as perfectly settled and acknowledged; and the whole of the coal-yielding rocks of the country have been unhesitatingly referred to the oolitic epoch, a conclusion by no means established.

The fossils obtained from these beds in the Rajmahal hills are numerous and beautifully preserved; and if not sufficient to decide their geological age will at least add much to our knowledge of the flora of the time.

We have thus traced the occurrence of beds or seams of coal in three distinct districts in Bengal in three formations of very distinct ages, but all of which have hitherto been referred to the same epoch; in the newer tertiary (miocene?) of the Sikim Sub-himalaya; in the older tertiary (eocene) of the Khasia hills; and in the secondary (probably oolitic, possibly carboniferous) rocks of the Rajmahal hills.

While endeavouring to avoid any detail, Mr. Oldham had to apologize for having so far trespassed on the time of the Society, being quite unprepared with diagrams or maps to illustrate his statements. Having come to Calcutta on other business, he had been requested by their Secretary to give a brief outline of the results of the examination of the districts he had visited, and for these results they were indebted to the zealous and untiring labours of his colleagues as much as to himself, labours carried on under difficulties which few geologists can fully appreciate.

#### LIBRARY.

The following additions have been made to the Library since the date of the last report.

#### *Presented.*

Archæologia, Vol. XXXV. p. 2.—BY THE SOCIETY OF ANTIQUARIES.

Proceedings of the Society of Antiquaries of London, Nos. 37 to 40.—BY THE SAME.

List of Members of ditto.—BY THE SAME.

Des Vedas par M. J. Bartholemy Saint Helaire, Paris, 1854, 8vo.—By THE AUTHOR.

Report on the Revenue Administration of the Tenasserim Provinces for 1851-52.—By THE GOVERNMENT OF BENGAL.

Report on the Revenue Administration of the Province of Arracan for 1851-52.—By THE SAME.

Selections from the Public Correspondence of the Punjab Administration, No. VIII.—By THE CHIEF COMMISSIONER OF LAHORE.

Proceedings of the Royal Society of London, No. 4.—By THE SOCIETY.

The Quarterly Journal of the Geological Society, No. 38.—By THE SOCIETY.

The Oriental Christian Spectator for August, 1854.—By THE EDITOR.

The Oriental Baptist, No. 93.—By THE EDITOR.

The Calcutta Christian Observer for September.—By THE EDITORS.

The Upadeshak, No. 93.

The Bibidhartha Sangraha, No. 29.—By THE EDITOR.

*Exchanged.*

The Athenæum for June, 1854.

The Philosophical Magazine, Nos. 47 to 49.

*Purchased.*

Comptes Rendus, Nos. 18 to 24.

Journal des Savants for April and May, 1854.

The Annals and Magazine of Natural History, for July, 1854.

Vuller's Institutiones Linguæ Persicæ cum Sanscritâ et Zendicâ Linguæ comparatæ.

De Bode's Bokhârâ.

Poper's Behmenjâr ben el Marzuban der Persische Aristoteliker aus Avicenna's schule.

Ponseca's French Portuguese and Portuguese French Dictionary, Paris, 1853, 8vo. 2 vols.

Constancio's Portuguese Grammar, Paris, 1849, 12mo.

S'ivasânkirtana, 1854, 12mo.

Bhagavatî Gîtâ, 1853, 12mo.

Jnânârnavâ, 12mo.

Bhaktivartma Pradars'aka, 1853, 8vo.

Kabitâratnâkara, 1830, 8vo.

Sûkabilâs, 1852, 8vo.

Bidagdha Mâdhava, 1849, 8vo.

Hâzâr masla, 8vo.

Kâyasthadipikâ, 1852, 8vo.

Krishna Lilâmrita, 1848, 8vo.

Jaggannâtha Mangala, 1848, 8vo.



Keyámat-námah, 8vo.

Vidyá Sundara, 1853, 8vo.

Sangita Taranga, 1849, 8vo.

Bhakta Mála, 1853, 8vo.

RA'JENDRALA'L MITTRA'.

6th Sept., 1854.

# JOURNAL

OF THE

## ASIATIC SOCIETY.

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No. VII.—1854.

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*Some account of the Botanical Collection, brought from the eastward, in 1841, by Dr. CANTOR. By the late W. GRIFFITH Esq., F. L. S. Memb. Imp. Acad. Natur. Curios.,—Royal Ratisb. Botan. Soc.,—Corr. Memb. Hort. Soc.,—Royal Acad. Turin,—Assist. Surgeon, Madras Establishment.*

NOTE.—The following paper has been printed for several years and was intended to form part of an interesting communication by Dr. Cantor on the Natural History of Chusan which was to lead off Vol. XXI. of the Asiatic Researches. This publication having been, for the present at all events, discontinued, Dr. Griffith's valuable Memoir on Chusan Botany has been reprinted and is now published with the four plates which accompanied it.—ED.

This collection consists of Plants from the Straits of Malacca, from Lantao, Chusan, and a few from Pekin: the bulk of the Chinese Plants being from Chusan. The Straits' specimens were, I believe, given to Dr. Cantor by the Rev. Mr. White, Chaplain of Singapore.

The following lists exhibit the genera and the number of species procured from the above-mentioned localities: the names of a few species being added:—

## STRAITS OF MALACCA.

## ACOTYLEDONES.

|              |     |             |     |     | No. of Species |
|--------------|-----|-------------|-----|-----|----------------|
| Lycopodineæ, | ... | Lycopodium, | ... | ... | 3              |
| Filices,     | ... | Lygodium,   | ... | ... | 1              |
|              |     | Gleichenia, | ... | ... | 2              |
|              |     | Polypodium, | ... | ... | 3              |
|              |     | Aspidium,   | ... | ... | 1              |
|              |     | Asplenium,  | ... | ... | 1              |
|              |     | Blechnum,   | ... | ... | 1              |
|              |     | Pteris,     | ... | ... | 1              |
| Total,       |     |             |     |     | 13             |

## DICOTYLEDONES.

## INCOMPLETE.

|               |     |                      |     |     |   |
|---------------|-----|----------------------|-----|-----|---|
| Taxineæ ?,    | ... | Dacrydium ?          | ... | ... | 1 |
| Urticeæ,      | ... | Ficus,               | ... | ... | 1 |
| Amaranthaceæ, | ... | Amaranthus,          | ... | ... | 1 |
| Nepenthaceæ,  | ... | Nepenthes,           | ... | ... | 2 |
| Asarinæ,      | ... | Thottea grandiflora, | ... | ... | 0 |
| Loranthaceæ,  | ... | Loranthus retusus,   | ... | ... | 1 |
| Total,        |     |                      |     |     | 6 |

## POLYPETALÆ.

|                   |     |                        |     |     |   |
|-------------------|-----|------------------------|-----|-----|---|
| Euphorbiaceæ,     | ... | Excœcaria,             | ... | ... | 1 |
|                   |     | Phyllanthus,           | ... | ... | 1 |
|                   |     | Rottlera,              | ... | ... | 1 |
| Bixaceæ,          | ... | Bixa,                  | ... | ... | 1 |
| Dilleniaceæ,      | ... | Tetracera,             | ... | ... | 1 |
| Sapindaceæ,       | ... | Nephelium lappaceum,   | ... | ... | 1 |
| Meliaceæ,         | ... | Aglaia odorata,        | ... | ... | 1 |
| Rutaceæ,          | ... | Evodia triphylla       | ... | ... | 1 |
| Ternstroëmiaceæ ? | ... | Ixonanthes reticulata, | ... | ... | 1 |
| Terebinthaceæ,    | ... | Boueia microphylla,    | ... | ... | 1 |
| Malvaceæ,         | ... | Paritium,              | ... | ... | 1 |
|                   |     | Urena,                 | ... | ... | 1 |
|                   |     | Sida,                  | ... | ... | 1 |

|                  |     |               |                           |             |     |     | No. of Species |
|------------------|-----|---------------|---------------------------|-------------|-----|-----|----------------|
| Tiliaceæ,        | ... | ...           | Grewia,                   | ...         | ... | ... | 1              |
| Dipterocarpeæ,   | ... | ...           | ...                       | ...         | ... | ... | 1              |
| Connaraceæ,      | ... | ...           | Connarus,                 | ...         | ... | ... | 1              |
| Legumi-<br>nosæ, | {   | Cassieæ,      | ...                       | Mezoneuron, | ... | ... | 1              |
|                  |     | Papilionaceæ, | ...                       | Bauhinia,   | ... | ... | 4              |
| ...              | ... | ...           | Crotalaria,               | ...         | ... | ... | 1              |
| Rosaceæ,         | ... | ...           | Rubus,                    | ...         | ... | ... | 1              |
| Memecyleæ,       | {   | ...           | Memecylon,                | ...         | ... | ... | 1              |
|                  |     | ...           | Pternandra,               | ...         | ... | ... | 2              |
| Melastomaceæ,    | ... | ...           | ...                       | ...         | ... | ... | 3              |
| Myrtaceæ,        | {   | ...           | Myrtus tomentosa,         | ...         | ... | ... | 1              |
|                  |     | ...           | Eugenia,                  | ...         | ... | ... | 4              |
|                  |     | ...           | Melaleuca Leucadendron,   | ...         | ... | ... | 1              |
|                  |     | ...           | Tristania Whitiana,       | ...         | ... | ... | 1              |
| Lythrarieæ,      | ... | ...           | Lagerstroemia floribunda, | ...         | ... | ... | 1              |
| Total,           |     |               |                           |             |     |     | 37             |

## MONOPETALÆ.

|                |     |            |                     |     |     |     |    |
|----------------|-----|------------|---------------------|-----|-----|-----|----|
| Compositæ, ... | ... | Conyza ?   | ...                 | ... | ... | ... | 1  |
| Rubiaceæ, ...  | ... | {          | Nauclea,            | ... | ... | ... | 2  |
|                |     |            | Mussaenda,          | ... | ... | ... | 1  |
|                |     |            | Ixora,              | ... | ... | ... | 1  |
|                |     |            | Epithinia malayana, | ... | ... | 1   |    |
| Myrsineæ, ...  | ... | {          | Ardisia,            | ... | ... | ... | 1  |
|                |     |            | Baeobotrys,         | ... | ... | ... | 2  |
| Styraceæ, ...  | ... | Symplocos, | ...                 | ... | ... | ... | 1  |
| Verbenaceæ,    | ... | {          | Clerodendrum,       | ... | ... | ... | 4  |
|                |     |            | Callicarpa,         | ... | ... | ... | 1  |
|                |     |            | Premna,             | ... | ... | ... | 1  |
|                |     |            | Vitex,              | ... | ... | ... | 1  |
| Total,         |     |            |                     |     |     |     | 17 |

## LANTAO, CANTON.

## ACOTYLEDONES.

|              |     |     |                     |     |     |     |   |
|--------------|-----|-----|---------------------|-----|-----|-----|---|
| Algae,       | ... | ... | ...                 | ... | ... | ... | 1 |
| Lycopodineæ, | ... | ... | Lycopodium cernuum, | ... | ... | ... | 1 |



|              |   |                  |     |     | No. of Species |
|--------------|---|------------------|-----|-----|----------------|
| Filices, ... | { | Lygodium, ...    | ... | ... | 1              |
|              |   | Gleichenia, ...  | ... | ... | 1              |
|              |   | Niphobolus, ...  | ... | ... | 1              |
|              |   | Cheilanthes, ... | ... | ... | 2              |
|              |   | Adiantum, ...    | ... | ... | 1              |
|              |   | Pteris, ...      | ... | ... | 2              |
|              |   | Cyathea ? ...    | ... | ... | 1              |
| Total, ...   |   |                  |     |     | 11             |

## MONOCOTYLEDONES.

|                 |   |                  |     |     |    |
|-----------------|---|------------------|-----|-----|----|
| Cyperaceæ, ...  | { | Cyperus, ...     | ... | ... | 1  |
|                 |   | Scleria, ...     | ... | ... | 1  |
| Gramineæ, ...   | { | Setaria, ...     | ... | ... | 1  |
|                 |   | Imperata, ...    | ... | ... | 1  |
|                 |   | Andropogon, ...  | ... | ... | 2  |
|                 |   | Anthistiria, ... | ... | ... | 1  |
|                 |   | Bambusa, ...     | ... | ... | 1  |
| Smilacineæ, ... |   | Dianella, ...    | ... | ... | 1  |
| Orchideæ, ...   |   | Spiranthes, ...  | ... | ... | 1  |
| Total, ...      |   |                  |     |     | 10 |

## DICOTYLEDONES.

## POLYPETALÆ.

|               |     |                   |                          |     |     |     |    |
|---------------|-----|-------------------|--------------------------|-----|-----|-----|----|
| Sterculiaceæ, | ... | Helicteres,       | ...                      | ..  | ... | ... | 1  |
| Cucurbitaceæ, | ... | Bryonia,          | ...                      | ... | ... | ... | 1  |
| Oxalideæ,     | ... | Oxalis,           | ...                      | ... | ... | ... | 1  |
| Rosaceæ,      | ... | Rubus moluccanus, | ...                      | ... | ... | ... | 1  |
| Leguminosæ,   | ... | {                 | Indigofera ?             | ... | ... | ... | 2  |
|               |     |                   | Lespedeza ?              | ... | ... | ... | 1  |
| Melastomaceæ, | ... | {                 | Melastoma malabathricum, | ... | ... | ... | 1  |
|               |     |                   | ———— sanguineum,         | ... | ... | ... | 1  |
| Myrtaceæ,     | ... | {                 | Myrtus tomentosa,        | ... | ... | ... | 1  |
|               |     |                   | Bæckia frutescens,       | ... | ... | ... | 1  |
| Total,        |     |                   |                          |     |     |     | 11 |

## MONOPETALÆ.

|                |  |                |     |     |   |
|----------------|--|----------------|-----|-----|---|
| Compositæ, ... |  | Cirsium ?      | ... | ... | 1 |
| Rubiaceæ, ...  |  | Nauclea Adina, | ... | ... | 1 |

|                |     |                          |     |     | No. of Species |
|----------------|-----|--------------------------|-----|-----|----------------|
| Apocynæ,       | ... | Strophanthus dichotomus, | ... | ... | 1              |
| Scrophularinæ, | ... | Siphonostegia chinensis, | ... | ... | 1              |
| Acanthaceæ,    | ... | Acanthus ilicifolius,    | ... | ... | 1              |
|                |     |                          |     |     | <hr/>          |
| Total,         |     |                          |     |     | 5              |
|                |     |                          |     |     | <hr/>          |

Among a few *Indeterminatæ* are two species of a radicant herbaceous genus, with opposite fleshy leaves, and rubiaceous stipulæ.

### CHUSAN.

#### ACOTYLEDONES.

|              |     |             |             |     |       |   |
|--------------|-----|-------------|-------------|-----|-------|---|
| Lycopodineæ, | ... | Lycopodium, | ...         | ... | ...   | 1 |
| Filices,     | ... | {           | Lygodium,   | ... | ...   | 1 |
|              |     |             | Pleopeltis, | ... | ...   | 1 |
|              |     |             | Aspidium,   | ... | ...   | 3 |
|              |     |             | Pteris,     | ... | ...   | 2 |
|              |     |             | Total,      | ... | <hr/> | 8 |

#### MONOCOTYLEDONES.

|                 |     |                           |                               |     |     |       |
|-----------------|-----|---------------------------|-------------------------------|-----|-----|-------|
| Cyperaceæ,      | ... | Cyperus,                  | ...                           | ... | ... | 1     |
| Gramineæ,       | ... | Panicum stagninum,        | ...                           | ... | ... | 1     |
| Commelineæ,     | ... | Commelina,                | ...                           | ... | ... | 1     |
| Smilacineæ, ... | ... | {                         | Smilax,                       | ... | ... | 1     |
|                 |     |                           | Scilloidea* (without leaves,) | ... | ... | 1     |
| Orchideæ,       | ... | Eulophia?                 | ...                           | ... | ... | 1     |
| Alismaceæ,      | ... | Sagittaria,               | ...                           | ... | ... | 1     |
| Hydrocharideæ,  | ... | Hydrocharis Morsus ranæ?* | ...                           | ... | ... | 1     |
| Lemnaceæ,       | ... | Lemna,                    | ...                           | ... | ... | 1     |
|                 |     |                           |                               |     |     | <hr/> |
| Total,          |     |                           |                               |     |     | 9     |
|                 |     |                           |                               |     |     | <hr/> |

#### DICOTYLEDONES.

##### INCOMPLETEÆ.

|           |     |              |            |     |     |   |
|-----------|-----|--------------|------------|-----|-----|---|
| Taxineæ,  | ... | Salisburia,* | ...        | ... | ... | 1 |
| Coniferæ, | ... | {            | Juniperus, | ... | ... | 1 |
|           |     |              | Pinus,*    | ... | ... | 1 |

|               |     |                             |     |     | No. of Species |
|---------------|-----|-----------------------------|-----|-----|----------------|
| Amaranthaceæ, | ... | Achyranthes,                | ... | ... | 1              |
| Polygoneæ,    | ... | { Polygonum,*               | ... | ... | 7              |
|               |     | { Rumex,*                   | ... | ... | 2              |
| Elæagneæ,     | ... | Elæagnus,                   | ... | ... | 1              |
| Cupuliferæ,   | ... | Quercus,*                   | ... | ... | 1              |
| Salicineæ,    | ... | Salix babylonica,           | ... | ... | 1              |
|               |     | { Humulus                   | ... | ... | 1              |
|               |     | { Lupulus,*                 | ... | ... | 1              |
|               |     | { Cannabis sativa,          | ... | ... | 1              |
|               |     | { Morus nigra,              | ... | ... | 1              |
|               |     | { ——— alba,                 | ... | ... | 1              |
| Urticeæ,      | ... | { Urticea, (fragments,)     | ... | ... | 1              |
|               |     | { Urtica,                   | ... | ... | 1              |
|               |     | { Ficus,                    | ... | ... | 1              |
|               |     | { Artocarpea ? (fragifera,) | ... | ... | 1              |
| Total,        |     |                             |     |     | 24             |

## POLYPETALÆ.

|                  |     |                          |     |     |   |
|------------------|-----|--------------------------|-----|-----|---|
| Euphorbiaceæ,    | ... | { Elæococca verrucosa,*  | ... | ... | 1 |
|                  |     | { Stillingia sebifera,   | ... | ... | 1 |
|                  |     | { Acalypha,              | ... | ... | 1 |
|                  |     | { Phyllanthus,           | ... | ... | 2 |
| Ranunculaceæ,    | ... | { Ranunculus aquaticus ? | ... | ... | 1 |
|                  |     | { Clematis,*             | ... | ... | 1 |
| Nelumboneæ,      | ... | Nelumbium,               | ... | ... | 1 |
| Cruciferae,...   | ... | Sinapis,                 | ... | ... | 1 |
| Resedaceæ,       | ... | Reseda,*                 | ... | ... | 1 |
| Oxalideæ,        | ... | Oxalis,                  | ... | ... | 1 |
| Hypericineæ,     | ... | Hypericum,*              | ... | ... | 2 |
| Ternstroëmiaceæ, | ... | Camellia,*               | ... | ... | 2 |
| Aurantiaceæ,     | ... | Citrus,                  | ... | ... | 3 |
| Meliaceæ,        | ... | Aglaia,                  | ... | ... | 1 |
| Ampeliddeæ,      | ... | Vitis,                   | ... | ... | 2 |
| Celastrineæ,     | ... | Elæodendron,             | ... | ... | 1 |
| Rhamneæ,         | ... | Zyziphus,                | ... | ... | 1 |
| Tamariscineæ,    | ... | Tamarix,                 | ... | ... | 1 |
| Sempervivæ,      | ... | Sedum,                   | ... | ... | 1 |
| Xanthoxyleæ,     | ... | Xanthoxylum,             | ... | ... | 1 |

|                |     |                                      |     |     |     | No. of Species |
|----------------|-----|--------------------------------------|-----|-----|-----|----------------|
| Sterculiaceæ,  | ... | Sterculia,                           | ... | ..  | ... | 1              |
| Malvaceæ,      | ... | { Hibiscus,                          | ... | ... | ... | 1              |
|                |     | { Gossypium,                         | ... | ... | ... | 1              |
| Acerineæ, ...  | ... | Acer,*                               | ... | ... | ... | 1              |
| Hamamelideæ,   | ... | Hamamelis sinensis,                  | ... | ... | ... | 1              |
|                |     | { Fragaria,                          | ... | ... | ... | 1              |
|                |     | { Agrimonia,*                        | ... | ... | ... | 1              |
|                |     | { Rubus,                             | ... | ... | ... | 2              |
| Rosaceæ, ...   | ... | { Rosa,                              | ... | ... | ... | 1              |
|                |     | { Amygdalus,                         | ... | ... | ... | 3              |
|                |     | { Pyrus,                             | ... | ... | ... | 2              |
|                |     | { Cydonia,                           | ... | ... | ... | 1              |
| Leguminosæ,    | ... | Papilionaceæ,                        | ... | ... | ... | 6              |
| Melastomaceæ,  | ... | Melastoma ? sine fl. fr.             | ... | ... | ... | 1              |
| Granateæ, ...  | ... | Punica Granatum,                     | ..  | ... | ... | 1              |
| Myrtaceæ, ...  | ... | Myrtus,                              | ... | ... | ... | 1              |
| Araliaceæ, ... | ... | Hedera Helix ?*                      | ... | ... | ... | 1              |
| Umbelliferæ,   | ... | { Daucus,                            | ... | ... | ... | 1              |
|                |     | { Carum,                             | ... | ... | ... | 1              |
| Cucurbitaceæ,  | ... | { Cucurbita,                         | ... | ... | ... | 1              |
|                |     | { Actinostemma, ( <i>gen. nov.</i> ) | ... | ... | ... | 1              |
| Begoniaceæ,    | ... | Begonia,                             | ... | ... | ... | 1              |
| Total,         |     |                                      |     |     |     | 57             |

## MONOPETALÆ.

|                |     |                          |     |     |     |   |
|----------------|-----|--------------------------|-----|-----|-----|---|
| Compositæ,     | ... | { Cichoracea,            | ... | ... | ... | 1 |
|                |     | { Bidens,                | ... | ... | ... | 1 |
|                |     | { Artemisia,             | ... | ... | ... | 2 |
|                |     | { Eclipta prostrata ?    | ... | ... | ... | 1 |
|                |     | { Aster,                 | ... | ... | ... | 1 |
|                |     | { Chrysanthemum,         | ... | ... | ... | 1 |
|                |     | { Pulicaria,             | ... | ... | ... | 1 |
|                |     | { Gnaphalium,            | ... | ... | ... | 1 |
|                |     | { Emilia,                | ... | ... | ... | 1 |
| Rubiaceæ, ...  | ... | { Paederia foetida ?*    | ... | ... | ... | 1 |
|                |     | { Gardenia,              | ... | ... | ... | 1 |
| Caprifoliaceæ, | ... | Sambucus,*               | ... | ... | ... | 1 |
| Ericineæ, ...  | ... | Rhododendron,* efl. efr. | ... | ... | ... | 1 |
| Convolvulaceæ, | ... | Convolvulus,             | ... | ... | ... | 2 |



|                     |   |                          |     | No. of Species |
|---------------------|---|--------------------------|-----|----------------|
| Solaneæ, ...        | { | Nicotiana Tabacum, ...   | ... | 1              |
|                     |   | Datura fastuosa ? ...    | ... | 1              |
|                     |   | Solanum nigrum, ...      | ... | 1              |
|                     |   | ————— Dulcamara,*        | ... | 1              |
|                     |   | Capsicum, ...            | ... | 1              |
| Scrophularineæ, ... | { | Lycium, ...              | ... | 1              |
|                     |   | Veronica Anagallis, ...  | ... | 1              |
| Verbenaceæ, ...     | { | Bonnaya ? ..             | ... | 1              |
|                     |   | Verbena officinalis, ... | ... | 1              |
| Pedalineæ, ...      | { | Clerodendrum, ...        | ... | 2              |
|                     |   | Sesamum orientale, ...   | ... | 1              |
| Labiataæ, ...       | { | Mentha, ...              | ... | 1              |
|                     |   | Rosmarinus officinalis,* | ... | 1              |
|                     |   | Labiata alia, ...        | ... | 1              |
| Boragineæ, ...      |   | Symphytum ?              | ... | 1              |
| Oleineæ, ...        |   | Olea fragrans, ...       | ... | 1              |
| Plumbagineæ, ...    |   | Plumbago,*               | ... | 1              |
| Plantagineæ, ...    |   | Plantago,*               | ... | 1              |
| Total,              |   |                          |     | 35             |

*TENGCHOU, (Pekin.)*

|                      |                     |     |     |   |
|----------------------|---------------------|-----|-----|---|
| Geraniaceæ, ...      | Erodium, ...        | ... | ... | 1 |
| Sempervivæ, ...      | Sedum, ...          | ... | ... | 1 |
| Umbelliferæ, ...     | ... ..              | ... | ... | 1 |
| Compositæ, ...       | Artemisioides, ...  | ... | ... | 1 |
| Indeterminata eflor: | Staticeæ facie, ... | ... | ... | 1 |
| Total,               |                     |     |     | 5 |

*T O K I, (Pekin.)*

## MONOCOTYLEDONES.

|                 |                      |     |     |   |
|-----------------|----------------------|-----|-----|---|
| Gramineæ, ...   | Poa vel Festuca, ... | ... | ... | 2 |
| Smilacineæ, ... | Allium, ...          | ... | ... | 3 |
| Irideæ, ...     | Pardanthus, ...      | ... | ... | 1 |
| Total,          |                      |     |     | 6 |

## DICOTYLEDONES.

|                |     |                      |     |     |    |
|----------------|-----|----------------------|-----|-----|----|
| Polygonæ, ...  | ... | Polygonum Fagopyrum? | ... | ... | 1  |
| Urticæ, ...    | ... | Cannabis sativa,     | ... | ... | 1  |
| Tamariscinæ,   | ... | Tamarix,             | ... | ... | 1  |
| Silenaceæ, ... | ... | Dianthus,            | ... | ... | 1  |
| Rosaceæ, ...   | ... | { Potentilla,        | ... | ... | 1  |
|                |     | { Agrimonia,         | ... | ... | 1  |
| Leguminosæ,    | ... | Papilionaceæ,        | ... | ... | 4  |
| Primulaceæ,    | ... | Lysimachia,          | ... | ... | 1  |
| Asclepiadæ,    | ... | Cynanchum sibiricum? | ... | ... | 1  |
| Apocynæ? ...   | ... | ...                  | ... | ... | 1  |
| Convolvulaceæ, | ... | Convolvulus,         | ... | ... | 1  |
| Total, ...     |     |                      |     |     | 14 |

*The total number of Species in a state admitting of determination is as follows:—*

|                         |     |          |     |     |     |     |     |
|-------------------------|-----|----------|-----|-----|-----|-----|-----|
| Straits of Malacca, ... | ... | ...      | ... | ... | ... | ... | 81  |
| Canton, ...             | ... | ...      | ... | ... | ... | ... | 37  |
| Chusan, ...             | ... | ...      | ... | ... | ... | ... | 133 |
| Tengchou, ...           | ... | } Pekin, | ... | ... | ... | ... | 25  |
| Toki, ...               | ... |          | ... | ... | ... | ... |     |
| Total, ...              |     |          |     |     |     |     | 276 |

I shall now make such remarks as I am able on the most interesting forms of these collections.

## STRAITS' COLLECTION.

ASARINÆ.—The specimens of *Thottea* consist of a flower, part of a raceme, and a full grown leaf. A description and drawing of this plant, first met with by König in 1779, is now in the possession of the Linnean Society.

TERNSTROMIACEÆ?—I refer with some doubt to this family *Ixonanthes* of Jack. This genus, hitherto only known from Jack's description, has been placed doubtfully among *Cedrelaceæ* by Dr. Lindley and M. Endlicher; with which however its resemblances

appear to be rather technical. A more proper place is, I think, to be found between Ternstroëmiaceæ and Hypericineæ, the major part of the affinities being with the former family.

IXONANTHES.—*Jack. Mal. Misc. (Calc. Journ. Nat. Hist. 4. p. 115.)*

CHAR. GEN.—*Calyx* 5-6-partitus. *Corolla* 5-6-petala, glutinosa, convoluto-clausa. *Stamina* 10-20; filamentis capillaceis; antheris ovatis, bilocularibus. *Annulus* (crenulatus) inter stamina et pistillum. *Ovarium* 5-loculare, loculis biovulatis. *Ovula* pendula ex apice anguli interioris. *Stylus* capillaceus. *Stigma* discoideum. *Fructus* septicidim 5-valvis. *Semina* cum vel absque ala, sæpe sterilia et difformia. *Albumen* carnosum. *Embryo* lateralis. *Radicula* supera.

HABITUS.—Arbores *malayanæ* Folia alterna, exstipulata? venatione reticulata. Corymbi cymæve axillares. Flores parvi, inconspicui.

*I. reticulata*, foliis obovatis vel elliptico-obovatis integris, corymbis folia subæquantibus, staminibus 10, seminibus apice alatis.

*I. reticulata.* *Jack. Mal. Misc. (Calc. Journ. Nat. Hist. l. c.)*

HAB.—Singapore, *Rev. Mr. White.*

DESCR.\*—*Rami* angulati, flexuosi. *Folia* obovata, vel majora elliptico-obovata, obtusissima, late emarginata coriacea; venæ secundariæ arcuatim nexæ, interveniæ reticulatæ. *Pedunculi* axillares, solitarii, folia subæquantia vel excedentia, dichotomi. *Pedicelli* plerumque ternati, *Flores* cujusve cymæ sub-7, materie resinosa glutinosa aspersa, parvi. *Sepala* ovato-oblonga vel rotundata. *Petala* paullo majora, convoluta, apice quasi perforata. *Stamina* 10, in annulo glanduloso crenulato ovarii basin arcte cingente inserta. *Filamenta* capillacea, petalis 4 plo longiora, per os angustum corollæ longe exserta. *Antheræ* oblongæ, basi affixæ; connectivo lato; loculis angustis. *Ovarium* globoso-conicum. *Stylus* capillaceus, filamentis longior. *Stigma* discoideum.

*I. dodecandra*, (n. sp. ?) foliis obovata-lanceolatis crenato-serratis, corymbis felia superantibus, staminibus 13-16, seminibus perfectis paucis hilo processigeris, sterilibus difformibus processibus hili sæpius tricuribus.

\* From a single specimen in flower.

HABIT.—Woods about Pringitt, and near Rhim, Malacca.

DESCR.\*—*Arbor* majuscula. *Folia* alterna, exstipulata, breve petiolata, obovato-lanceolata, obtusa, emarginata, coriacea, crenato-serrata (sæpius distanter,) subtus reticulata, sicca castaneo-brunea: magnitudine varia, majora nempe 6-uncias longa, 2-lata, minora long. 3-uncialia, lat. 1-uncialia. *Corymbi* axillares, folia excedentes, multiflori, *e cymis* dichotomis sub-6-floris conflati. *Bracteæ* caducæ. *Flores* parvi, inconspicui, viridescences, glutinosi. *Calyx* ultra medium 5 partitus, (potius 5-sepalus, pedicellis apice incrassatis); laciniae corollam fere æquantes, oblongæ, acutæ. *Corolla* convolutoclausa, apice quasi perforata. *Petala* rotundato oblonga, concava, venosa. *Annulus* brevis, carnosus, crenulatus, inter stamina et pistillum. *Stamina* 13-16. *Filamenta* annulo basin versus inserta, capillacea, diu persistentia. *Antheræ* ovatæ, biloculares, longitudinaliter dehiscentes, deciduæ. *Pollen* tri-porosum. *Ovarium* conicum, sub-5-gonum, 5-loculare. *Ovula* 2 cuius loculo, anatropa, pendula ex apice anguli interioris ope funiculorum longiusculorum. *Raphe* extrorsa. *Stylus* capillaceus, ovario 6-plo longior, stamina paullo superans, diu persistens. *Stigma* capitatum, margine reflexum. *Fructus* anguste ovatus, acutus, 7-8. lineas longus, 3-4-latus, basi calyce et corolla circumdatus, lineis 5 notatus, septacidim 5-valvis, valvis osseis intus centro carinatis. *Semina* sæpius abortientia, processu foraminis sursum et deorsum longe producto, infero sæpius bicruri; *perfectum* brunneum, oblongo-lanceolatum, compressiusculum, processu foraminis sub 3-auriculato. *Tegumentum* exterius coriaceum: interius tenuissimum, albumen arete vestiens. *Raphe* semi-completa. *Chalaza* subdepressa. *Albumen* carnosum, copiosum. *Embryo* ad latus exterius albuminis. *Radicula* longa, gracilis, longitudine cotyledonum foliacearum. *Plumula* inconspicua.

This species appears to be allied to *T. icosandra*, Jack, from which it chiefly seems to differ in the number of the stamina.

ANACARDIÆ.—Compilers appear to have overlooked Buchanan's† remarks on the opposite leaved mangoes, the original species only

\* Chiefly from dried specimens; of the seeds from living ones.

† Mem. Wern. Soc. 5, p. 326.



being referred to by Steudel\* and Endlicher.† Yet besides the two species founded by Buchanan (loc. cit), I believe without sufficient grounds, on the *Manga sylvestris prima et altera* of Rumph,‡ Buchanan's description of the Burmese *Mariam* is so different from that of Roxburgh, as to lead to the suspicion, that under the name *Mangifera oppositifolia*, two species will be found.

Up to this time, I have met with three species, of which the following are the distinguishing marks, independently of differences that may exist in their hermaphrodite flowers and fruit.

BOUEIA, § Meisner. || *Cambessedea*, Wight and Arnott. ¶

*B. burmannica*, foliis oblongo-lanceolatis, paniculis laxifloris foliis brevioribus parce puberulis, petalis sæpissime 4 lineari-oblongis calycem subduplo excedentibus.

*Mangifera oppositifolia*. \* *Roxb. Hort. Bengh.* p. 18. *Fl. Indic.* 1. p. 640. *ed. Carey.*

*Manga sylvestris*, *Rumph. Hb. Amb.* 1, t. 27 ?

\* Nomenclat. Bot, ed : 2da.

† Gen. Pl. p. 1133, No. 5918.

‡ Rumph. under the head *Manga sylvestris*, does not mention the opposition of the leaves, and though his figure, t. 27, might pass for *Mangifera oppositifolia*, yet the leaves are by no means represented as being generally opposite, and the aspect of the flowers again is rather that of a genuine Mango.

§ This genus was first proposed, and its differences from *Mangifera* given, by Messrs. Wight and Arnott under the name *Cambessedea*, for which, from its being pre-occupied, Meisner has substituted *Boueia*. But no sign or mark is appended to indicate who were the original proposers of the genus, with whom the merit must in most cases necessarily rest. It is one thing to glance over a complete Catalogue of names, and ascertain which is pre-occupied, another to detect and define a new group. Botanists have admitted certain conventional signs, which have been generally adopted, and would do well to admit signs of a most conspicuous character by which the compiler may be known from the designer; the Botanist who names after examination and comparison, from him who names without having done either. Or as suggested in the excellent rules for reforming Zoologic Nomenclature, p. 8, para. 4, now that communication is so rapid, it might be courteously left to the framer of the genus to correct the error.

|| Endl. Gen. Pl. 1. cit.

¶ Prod. Fl. Pen. Ind. Or. p. 170, in annot.

\* The opposition of the leaves being characteristic of the genus, it becomes necessary to change Roxburgh's name.

HABIT.—Commonly cultivated by the Burmese, by whom it is called *Mariam*, or *Mai-een*.

*Arbor* parva, ramulis compressis angulatis. *Folia* anguste oblongo-lanceolata, obtuse acuminata vel cuspidata, coriacea, longitudine 5-uncialia, latitudine  $1\frac{1}{2}$ -uncialia. *Stamina* sæpissime 4. *Drupa* magnitudine ovi gallinulæ.

Buchanan describes the inflorescence of his plant as “spica simplicissima foliis multo longior,” and the fruit as, “drupa figura et sapore *Mangiferæ indicæ*.” But he appears only to have been acquainted with Roxburgh’s plant through the Hortus Benghalensis, a catalogue containing no characters or discriminative marks.

*B. macrophylla*, (n. sp.) foliis oblongo-lanceolatis, paniculis amplis thyrsoideis pubescentibus foliis brevioribus, petalis sæpissime 3 calyce subtriplo longioribus.

HABIT.—Malacca. *Roomaniya Baitool* of the Malays.

*Arbor* magna, corona densa. *Ramuli* tetragoni. *Folia* valde coriacea, obtuse et brevi cuspidata, long. 6. 8-uncialia, latit.  $2-2\frac{1}{2}$  uncialia. *Panicula* dense thyrsoidea. *Stamina* sæpissime 3.

*B. microphylla*, (n. sp.) foliis lanceolatis, paniculis parvis thyrsoideis foliis brevioribus, petalis 4 oblongo-rotundatis calyce duplo longioribus.

HABIT.—Malacca. *Roomaniya Paigo* of the Malays.

*Arbor*, ramulis compressis. *Folia* longe et obtuse cuspidata, valde coriacea, longit.  $2-3\frac{1}{2}$  uncialia, latit.  $1-1\frac{1}{2}$  uncialia. *Paniculæ* parvæ, foliis aliquoties breviores. *Flores* minus elongati, minuti. *Drupa* magnitudine ovi gallinulæ.

The habit of these two species is different from that of the Burmese one, the leaves more coriaceous, and the secondary veins, more distinct.

The fruit of both is eaten by the Malays. They have the characteristic acidity, but make excellent pickles.

The genus presents a remarkable analogy with *Oleina*.

MEMECYLEÆ.—*Pternandra*, Jack, (*Ewyckia*, Blume), though referred by Dr. Lindley to *Melastomaceæ*, appears to me to belong to *Memecyleæ*. The genus is remarkable for its placentation, which is the only instance I am acquainted with of the co-existence of thoroughly parietal placentation with perfect dissepiments, inde-

pendently of any apparent production inwards of any parts of the placental surface. Hypothetically this is explainable by assuming the ovula to be confined to that part of the carpellary leaf with which almost invariably they have no manner of connection. In other words, they may be declared to arise from the back of the carpel leaf, or from the midrib, and the space on either side between it and the inflected margins.\*

Appearances, derived from the examination of *Pternandra cœrulescens*, are not perhaps altogether unfavourable to the supposition, that there is a disturbance in the direction of the carpel leaves analogous to that which affects some, perhaps most *Boragineæ*, by which the true apex of each carpellum is brought close to the base, and in which, as appears to me suggested by the situation of the raphe, the placenta has a disposition to be dorsal; so that if a polysporous placenta be found to exist in a carpellum so constituted, it may, I am inclined to conjecture, be as dorsal as it is in *Pternandra*.

From the evidence afforded by this genus, it would appear, that an "ovarium inferum" may have part of its cavities, or even of its placenta actually *superior*; that is, above the line drawn when the term "ovarium inferum" is made use of; which term, nevertheless, is perhaps quite as admissible in many instances as that of *ovarium adhærens*.

MYRTACEÆ.—I refer without doubt to *Tristania*, one of Mr. White's Plants. It is the fourth Indian species of the genus I have met with, the northerly limit of which, so far as yet known, appears to be Moulmein, 17° N. L. This is a fact of some interest, as Mr. Bennett† states, that he is only acquainted with one species found beyond the limits of N. Holland. In connection with this I may mention *Stylidium*, which is perhaps the last Australian form

\* Most of the instances hitherto cited as exhibiting dorsal placentation, appear to me to be untenable, and naturally explicable. But it is certain that *Monocotyledonous monstrosities* do occur, in which the buds arise from the inner surface of the leaves to the exclusion of the usually gemmiferous margins. Of this I met with a marked instance in a *Liliaceous* plant in Eastern Affhanisthan.

† Pl. Jav. Rar. Pt. 11, p. 128.



that disappears, an instance of the genus having been found by Dr. Voigt about Serampore, and by Lieut. Kittoe at Midnapore. This genus also occurs at Mergui and Moulmein, but has not hitherto been remarked on the Khassya Hills or in Assam. Another Australian form, *Melaleuca Leucadendron*, forms from its abundance in the low littoral tracts of Malacca a very marked feature of vegetation. The northerly limit of this species is Mergui, (12° N. L.), where it occurs in similar localities, but comparatively limited in size and numerical extent.

Three of the four species above alluded to, may be thus distinguished:—

*Tristania burmannica*, ramulis glabris, foliis alternis obovato-lanceolatis glaberrimis, calyce extus pubescente intus cum ovario dense albo-tomentoso, staminum phalangis 4-6-andris.

HABIT.—Hills about Moulmein. No. 76, of a small Burmese Collection sent to Eugland in 1834.

Arbusculum. *Ramuli* et *inflorescentia* griseo-puberuli. *Folia* longitudine 4-uncialia, latitudine 1-1 $\frac{1}{4}$ -uncialia *Pedunculi* compressi. *Cymæ* confertifloræ, foliis duplo breviores, pedicelli plerumque terni. *Florum* odor pessimus. *Petala* integra, cum filamentis parce puberula.

*T. merguensis*, ramulis subglabris, foliis alternis spathulato-lanceolatis basi biauriculatis, calyce et ovario puberulis, staminum phalangibus 6-10 andris, capsula semisupera.

HABIT.—Sea-shore of the Island Madamacan, opposite Mergui, in flower in August. No. 235, Herb. Mergui.

*Arbor* ramis pendentibus, *Folia* alterna vel subopposita, subsessilia, longitudine 7-7 $\frac{1}{2}$  uncialia, latitudine 2-2 $\frac{1}{4}$ -uncialia. *Pedunculi* ancipites, foliis subduplo breviores; pedicelli minute puberuli. *Florum* odor pessimus, stercoraceus. *Petala* alba, denticulata. *Phalanges* petala excedentes. *Capsula*  $\frac{2}{3}$  supera, semi-inclusa, loculicidim et septifragim trivalvis, valvis extus transverse rugosis. *Semina* arcte collateralia, plura paleacea abortiva, pauciora apice alata, fertilia. *Cotyledones* contortuplicatæ.

*T. Whitiana*, foliis alternis spathulato-obovatis parce puberulis, ramulis calyceque extus puberulis, calyce intus et ovario tomentoso-puberulis, staminum phalangibus 2-4 andris.



HABIT.—Singapore. Malayan name *Plowan*. Rev. Mr. White.

*Folia*, in apice ramorum conferta, obtuse cuspidata, longitudine  $4-4\frac{1}{2}$ , latitudine  $1\frac{1}{2}-1\frac{3}{4}$  uncialia; *venæ* secundariæ magis approximatae et parallelæ. *Corymbi* folia excedentes, puberuli. *Petala* undulata.

Of these *T. burmannia* is closely allied to *P. obovata* Bennett in Horsf. Pl. Jav. Rar. p. 127. t. 27.

The fourth species was met with sparingly in fruit on Mount Ophir; in the form of its leaves it approaches to *T. obovata*, but the fruit is rounder. The peduncles appear much less branched than in any of the other extra-Australian species, but the degree of adhesion between the calyx and pericarpium is the same. It was observed with *Bækea frutescens*, three species of *Leptospermum*, and one of *Leucopogon*.\*

I know so little of the Australian species of this genus and family that I am unable to state what value should be attached to the placentation in these four extra-Australian species, to the abortion and deformity of most of the seeds, the wing of the fertile one, and the embryo. The habit and especially geographic distribution would seem to point to some degree of separation. It is to be remembered, however, that Mr. Bennett in the Pl. Jav. Rar., a work of the highest authority, does not remark on any structural peculiarity presented by *Tristania obovata*, his specimens of which, excepting the absence of ripe seeds, appear to have been complete.

RUBIACEÆ.—I notice *Epithinia mayana*, to confirm Messrs. Wight and Arnott's statement, that it has stipulæ. The opposite statement, in the Malayan Miscellanies, I have ascertained was corrected† by Dr. Jack himself in a copy found thrown aside among some

\* The Mount Ophir species of this genus, which is not uncommon at Paddam Bhattoo, differs from that found on the littoral tracts of Malacca in the narrow leaves crowded on short branches, the corolla scarcely partite to the middle, the large hypogynous scales which nearly enclose the ovary, and the smooth filiform style. For this the name *L. ophirensis* may be proposed.

Indeed it was improbable that an exclusively littoral plant should make its appearance suddenly on an isolated Mountain at an elevation of 2000 feet any where: much more so on Mount Ophir, the productions of which from Paddam Bhattoo upwards are very dissimilar from general Malacca vegetation, approaching much more to that characteristic of Polynesia and Australia?

† Instead of "Stipules none," it is, "stipules short, interpetiolar."

loose papers in the Botanic Gardens. There are at the Botanic Gardens some other MS. corrections which might have been advantageously inserted in the reprint of his writings, undertaken by Sir W. Hooker at the suggestion, I believe, of Dr. Wallich.\*

The disposition of the placentæ and ovula in this genus is curious. The former, or perhaps rather their ovuliferous portions, are confined to the middle of the inner angle of each cell, from which they are produced outwards into the middle. Each bears on its apex two ovula, the upper one of which is erect, the under pendulous; the raphe of both being on that side of the ovulum next the outer wall of the cell. The result, when both ovula are matured, is, that two anatropous seeds of which one is erect and one pendulous, have the radicles of their embryos pointing exactly towards one another.

#### CANTON COLLECTION.

This is entirely tropical, and the only peculiar forms that appear to me to exist in it are *Nauclea Adina*, *Strophanthus dichotomus*, and *Siphonostegia sinensis*. For *Bæckia frutescens* is found on Mount Ophir, with some other Australasian or Polynesian forms, and *Myrtus tomentosa* is to be found in abundance in the Straits of Malacca. But *Siphonostegia*, the specimens of which present additional calycine lobes, is the only local or characteristic form, for *Nauclea* is not only a common Indian genus, but there is, I believe, a *Khasiya* form that approaches *N. Adina* itself, and *Strophanthus* exists on the N. E. frontier of Bengal, and about Malacca, where it is represented by a very fine species with large horn-like follicles. All the remaining genera, and probably almost all the species, may be met with either on the Tenasserim Coast or on the Eastern frontier of Bengal.

#### CHUSAN COLLECTION.

The list of this collection given at the commencement is not limited to plants actually existing in the collection, but includes a few others, either contained in Dr. Cantor's sketches, or in his conspectus of his collections.† I have attached an asterisk to those

\* Are there any other MSS. of Jack in existence? I find references in Dr. Wallich's hand-writing to a MS. description of *Hoya grandiflora*, in an imperfect copy of Carey's edition of Roxburgh's *Flora Indica*.

† Calc. Journ. Nat. Hist. No. V.

forms which seem to me to be extra-tropical, from which it would appear that the great bulk (about 5-6th) is decidedly tropical.

This collection presents an unusual mixture of form, much of which is perhaps attributable to the effects of cultivation. Almost all the genera are to be met with in "India Orientalis," but I imagine scarcely any other like locality could present such a mixture as that of *Commelina*, *Hydrocharis*, *Salisburia*, *Achyranthes*, *Pinus*, *Aglaia*, *Humulus* *Lupulus*, *Pæderia*, *Juglans*, *Zingiber*, *Agrimonia*, *Nelumbium*, *Rhododendron* and a *Palm*.

The most marked northern forms appear to me to be *Hydrocharis*, *Salisburia*, *Pinus*, *Quercus*, *Humulus* *Lupulus*, *Agrimonia*, *Rhododendron*, *Solanum Dulcamara*?

*Clematis*, *Rumex*, *Camellia*, *Hedera*, *Sambucus* and *Plantago* all admit of some degree of explanation, in as much as these genera may be found at similar levels, but in considerably lower latitudes, in certain parts of the Eastern frontier of Bengal; and some species of *Juniperus* under cultivation seem to defy a great amount of heat.

Other similarities to the Flora of our Eastern frontier, Assam for instance, are indicated by the affinity of the *Quercus* to one from the Khasiya Hills, on which it is, so far as I know, the only European form of that genus; by one of the *Polygonæ* which also occurs in the same direction, and which is remarkable for its armed habit, perfoliate leaves, and bright azure berries, and by the genus *Actinostemma*.

The only parts of this collection which I feel myself at all competent to illustrate, are *Hamamelideæ* and *Cucurbitaceæ*.

*HAMAMELIDÆÆ*.—The species is *Hamamelis sinensis*, R. Br.; the specimens are in fruit, and look at first sight not unlike some *Grewias*.

The Asiatic plants of this family are *Bucklandia populnea*, two species of *Hamamelis*, one of *Fothergilla*? found by Dr. Falconer, and I believe M. Jacquemont, in Cashmir, and one of *Corylopsis*.\*

#### CORYLOPSIS.

\* *Zuccar. in Sieb. Fl. Japon. fasc. 1. p. 45. t. 19. 20. Endl. Gen. Plant. p. 804. No. 4589.*

CHAR. GEN.—*Calyx* semi-inferus, 4-5 dentatus vel partitus. *Petala* 4-5, spathulata vel obovata. *Stamina fertilia* 5, sepalis opposita; antherarum loculi secus



*Sedgwickia*, which I some time ago, from examination of fruit-bearing specimens, referred to *Hamamelideæ*, turns out to be a

centrum longitudinaliter dehiscentes, valvis extrorsum flexis persistentibus; *sterilia* 5, vel plura (sub-15) irregularia. *Ovarium* semi-inferum. *Ovula* solitaria. *Semina* ex-alata.

**HABITUS.**—*Frutices Japonicæ et Himalayanæ, habitu Coryli. Gemmarum squamæ imbricatæ. Stipulæ scariosæ, caducæ, gemmarum squamas extimas formantes. Folia cordata, mucronato-serrata, pennivenia. Spicæ præciæ, terminales et axillares, basi squamis gemmarum involucrantibus, interdum subpetaloideis stipatæ, pendulæ, sericeopilosæ; fructus induratæ.*

**OBS.**—*Hamamelis*, genus propinquum, differt habitu, et petalis elongatis æstivatione spiraliter involutis.

*C. himalayana*, (n. sp.) spicis multifloris, calyce cyathiformi 5-dentato villosa, petalis obovatis quam genitalia longioribus, staminibus fertilibus subinæqualibus pistillo longioribus, sterilibus sub-15, 10 majoribus ante petala, 5 minoribus ante stamina.

*Var. ? A.*—*Folia* subtus ad venas tantum piloso-tomentosa.

**HABIT.**—Bootan mountains; banks of the river and sides of woods at Tassangsee, alt. 5387 feet; on broken ground about Tongsa, alt. 6527 feet; and near Pangee Minzee Peeza, alt. 7500 feet.

*Var. ? B.*—*Folia* subtus tomentoso-pilosa.

**HABIT.**—Khasiya Hills; Moflung, alt. 5500 feet, on the broken rocky ground covered with bushes, between the bungalow and the river.

**DESCR.**—*Frutex* arbusculoideus, 6-8 pedalis. *Ramuli* flexuosi, brunneo-rubri. *Gemmæ* floriferæ alternæ, ex axillis foliorum lapsorum, demum pendulæ, superiores præcocioræ; *squamæ* plures, imbricatæ, ovatæ, scariosæ, extimæ brunnescentes intus sericæ, intimæ lutescentes utrinque sericæ, in bracteas sericeo-hirsutas sensim minorifactæ. *Folia* alterna; *petioli* sub-semunciales, albido-pubescentes; *lamina* cordato-roundata, breviter cuspidata, mucronato-serrata, coriacea, subtus pubescens, basi sub 9-venia, junior plicata secus venas; venæ secundariæ marginem versus oblique cURRENTES, inferiores latere exteriori 3-5-ties ramosæ, intermediæ dichotomæ versus apicem, summæ simplices; intervenia venulis transversis et anastomosantibus reticulatæ. *Spicæ* pendulæ, longit. 1-1½-unciales, multifloræ, sericeo-hirsutæ, *Flores* majusculi, lutei, suaviter odori, hermaphroditti.

*Calyx* breve obconicus 4-5 fidus, laciniis ovatis submembraneis. *Petala* 5, perigyna, lacinis calycinis alterna, lutea, obovata, breve unguiculata, irregularia, majoribus patentibus conduplicato-plicatis, margine involutis; æstivatio aperta.

*Stamina* fertilia 4-5, sepalis opposita, fauci calycis inserta; *filamenta* robusta, breviuscula, fere cylindrica; *antheræ* biloculares, longitudinaliter dehiscentes, valvis coriaceis, extrorsum flexis, dorso mutuo applicitis, persistentibus, *Pollen* globosum, plicis 3 medio 1-porosis. *Stamina* sterilia plura, irregularia, subbi-



species of Liquidambar,\* (*Altingia* of Noronha), on which genus Blume constructed his family Balsamifluæ. For this oversight and empty compliment, Dr. Wallich is responsible, as he had Blume's *Flora Javæ* (in which folio work, the family is defined and the genus figured,) before him during the printing of my MSS.

The family Balsamifluæ (Balsamaceæ, Lindl.) appears to be generally considered allied to Platanææ, Salicineæ, and some of their neighbours. And although the structure of *Bucklandia* was not detailed before 1836, it still appears to me odd, that no indication of the similarity of Liquidambar with *Fothergilla* had been noticed.

From the great variety in structure presented by Hamamelideæ, in which family, limited as it is in genera and species, plants occur varying in habit, with hermaphrodite or polygamous flowers, with petals or without petals, with a quaternary or quinary number of parts, with definite or indefinite stamina, with simple or valvular dehiscence of anthers, I am inclined to believe that Balsamifluæ will be found to be a temporary, or at least a subordinate group. Its present claims to distinction seem to me limited to the male inflorescence and flowers, which are, so far as I can judge from dried

seriata; extiora sæpius dentiformia, interdum subulata, filamentorum basibus sæpius opposita; interiora sæpissime per paria petalis opposita, majora, atroviridia, apicibus subglanduliformibus sæpe recurvis. *Ovarium* semi-inferum, sericeo-pilosum, biloculare. *Styli* 2, subulati, staminibus subduplo breviores, apicibus recurvis subdilatis intus stigmatosis. *Ovula* inloculis solitaria, pendula, anatropa; *tegumenta* bina; *foramen* magnum, extus spectans.

*Spicæ* fructus pendulæ, induratæ, bracteis orbatæ. *Capsulæ* scriebus circiter 4 spiraliter dispositæ, (dimidium inferius calyce tubo indurato corticatum,) biloculares, bivalves, valvis demum septicidim bipartitis, stylisque semi-partis recurvis apiculatis; *endocarpium* atrum. *Semina* non visa.

My specimens of the Khasiya plant are in fruit. I have not therefore been able to compare the flowers. The leaves vary much in size, those on the mere leaf-bearing branches being as large as those of the Minza Peeza specimens. These again differ from the other Bootan ones in the spikes being less *precious*, in the length of the styles, and in the longer and pale ferruginous hairyness of the spikes.

This is the fourth species of this genus, two having been defined, and one indicated in the *Flora Japonica*, (loc. cit.) of the three Japanese species only one, *C. Cesakii*. Zucc. has been hitherto met with in the wild state.

\* *Fl. Jav. p. l. t. l. 2.*

specimens of the Assam species, deficient in any envelope analogous to a perianth or even partial bracte. Its habit presents nothing peculiar; it is not more characteristic of the "Amental" order than that of *Fothergilla* or *Corylopsis*. Its anthers present no very great peculiarity, particularly if compared with those of *Fothergilla*, while its female flowers are in many essential points closely allied to those of *Bucklandia*, in which, and I take this to be of considerable importance, female capitula also occur, and the ovula are considerably increased in number.

The affinities of *Hamamelideæ* appear to be sufficiently complex, the first step to the simplification, the determination of the true nature of the female perianthium not being settled.\* In addition to those already indicated, a relationship with certain *Laurineæ* may be suggested.

**CUCURBITACEÆ, *Zanoninæ*.**—Of the two plants of this family among the Chusan Plants, one belongs to a genus hitherto, I believe, undescribed.

### ACTINOSTEMMA.

**CHAR. GEN.**—*Flores* monoici; *masc.* rotati. *Sepala* 5, acuminata. *Petala* 5, acuminatissima. *Stamina* 5, soluta, antheris unilocularibus. *Fæm*; *Sepala et petala* maris. *Ovarium* 1-loculare; *ovula* 2-4, parietalia apicem versus loculi. *Stylus* 1. *Stigmata* 2, reniformia. *Capsula* echinata, semisupera, annulata, ad annulum demum circumscissa. *Semina* pendula, margine exarata.

**HABITUS.**—*Herba scandens, tenera. Folia subhastata, dentata. Cirrhi laterales. Flores inconspicui, viridescentes masculi paniculati, fæminei racemosi, pedicellis medium supra articulatis. Circumscissio capsulæ per annulum cicatricis perianthii.*

*A. tenerum.*

**HABIT.**—In hedges, Sadiya, Upper Assam, also on the Khasiya Hills.—Chusan, *Dr. Cantor*.

\* I have not been able to ascertain from dried specimens the nature of the envelope of the pistillum of *Liquidambar*. Judging from the Assam specimens, and the resemblance to the same part of *Bucklandia*, it is fairly assumable to be calyx. Blume, however, who has described and figured the genus in detail, represents the envelope as derived from scales, united among each other.

DESCR.—*Planta* scandens, herbacea. *Caules* angulati, sulcati, parce puberuli. *Folia* longiuscule petiolata, juniora cordato-hastata, matura fere hastata, acuminata, grosse dentata, dentibus mucrone terminatis, (basilaribus 1 vel 2 glanduliferis,) subtus ad venas puberula. *Cirrhi* sæpe apice dichotomi. *Inflorescentia* axillaris, puberula. *Paniculæ* masculæ foliis sæpius longiores. *Bracteæ* minutæ, subulatæ. *Flores* caduci, inodori, evolutione centrifugi. *Calyx* profunde 5-partitus, laciniis lineari-lanceolatis, acuminatis, extus puberulis, basi obsolete saccatis. *Petala* alternantia, fundo calycis inserta, breviter unguiculata, e basi lanceolata acuminatissima, univenia, æstivatione subimbricata, margine, uti sepala, glanduloso-denticulata. *Stamina* imo fundo calycis inserta, sepalis opposita, omnino soluta; *filamenta* filiformia, breviuscula; *antheræ* extrorsæ, sub-ovatæ, uniloculares, longitudinaliter dehiscentes, *connectivo* glanduloso-papilloso. *Pollen* lanceolatum, tri-plicatum, immersum globosum, granulose. Rudimentum *Pistilli* nullum.

*Racemi* fæminei pauciflori, flore unico sæpius tantum evoluto. *Pedicelli* prope florem articulati. *Calycis tubus* subglobosus, verrucosus. *Stamina* castrata vel deficientia. *Ovarium*  $\frac{2}{3}$  inferum, (parte libera conica verrucosula,) 1-loculare; *placentæ* punctiformes, parietales apicem loculi versus. *Ovula* 2-4, sæpius 4, 2 nempe utroque latere, pendula, anatropa; *tegumenta* bina distincta. *Stylus* brevis, crassus, parce puberulus. *Stigmata* hippocrepiformia. *Fructus* siccus, pendulus, (pedicello petiolo brevior, infra articulum gracili, supra incrassato,) ovatus, apice stigmatidis reliquiis notatus, medium versus annulo exsculptus, aculeis viridibus præsertim infra annulum echinatus, apice subglaber, tactu lævi ad annulum circumscissus. *Semina*\* 2, vel sæpius 4, pendula, atro-brunnea, tactu saponacea, compressa, superficie rugosa, margine profunde exarata et varie denticulata. *Embryonis cotyledones* ovales, carnosæ; *radicula*, supera, breviuscula, conica; *plumula* conspicua.

This plant has to a considerable degree the habit of *Feuillea tamnifolia*, Humb. et. Kunth. Nov. Gen. et Sp. p. 175. t 140, which appears to be a plant sui generis; it also appears to have considerable affinities with *Sicyos*, with which it agrees in habit.

\* The seeds in the Chusan specimen are plano-convex, and scarcely grooved along the edges.



I am, besides this plant, in possession of the two undermentioned genera of the same sub-family.\*

\* GOMPHOGYNE.—*Flores* monoici ? ; *masc.* rotati. *Sepala* 5. *Petala* 5, lanceolata. *Stamina* 5, soluta, antheris unilocularibus. *Fæm* (tubus clavatus.) *Petala* acuminatissima. *Ovarium* inferium, 1-loculare ; *ovula* 3, pendula ex apice loculi. *Fructus* capsularis, apice truncato dehiscens. *Semina* 2, rugosa, margine incrassato.

*HABITUS*.—Herba scandens, carnosa, habitu *Cissi*, foliis pedatis. Fl. masculi longe paniculati, fæminei racemosi, racemis paucifloris nutantibus. *Petala* fl. masculi denticulato-fimbriata, pagina papillosa. Filamenta ima basi coalita. *Pedicelli florum fæmineorum articulati*. *Perianthium reflexum*. *Fructus venosus, interveniis reticulatis*. *Semina utrinque rapheos completæ rugoso-marginata*.

*OBS*.—Genus affine *Zanonie* situ stylosum, forma et dehiscentia capsulæ ; *Actinostemmati* calyce pentasepalo, petalis fæminei floris acuminatis, et ovarii unilocularis placentis punctiformibus.

*G. cissiformis*.

*HABIT*.—Budrinath, Himalayan Range. *Mr. Edgeworth*.

*DESCR*.—"Scandens, glaberrima. *Folia* longe petiolata, pedata, foliolis septenis, lanceolatis, inciso-serratis, dentibus mucronulatis. *Cirrhi* oppositifolii, sæpius simplices. *Fl.* ♂. racemosi, in apice ramorum sæpius defoliorum sicut paniculam longissimam formantes, breviter pedicellati, pentameri. *Sepala* et *petala* pubescentia, viridescencia. *Stamina* 5, libera. *Fl.* ♀ fasciculati, longe pedunculati. *Calycis* lacinie 5, subulatæ persistentes. *Petala* 5, ovata, acuta. *Styli* 3, apice bifidi. *Fructus* subtrigono-campaniformis, apice truncatus et planus, cornutus stylis persistentibus, apice dehiscens, 1-locularis, ex abortu seminis unius dispermus. *Semina* crassa, oblonga, nigra, margine intrassato rugosa, amarissima." Edgeworth MSS.

*ENKYLIA*.—*Flores* dioici ? ; *masc.* rotati. *Sepala* 5. *Petala* 5, acuminatissima, æstivatione involuta. (a) *Stamina* 5 ; filamentis complete monadelphis, antheris unilocularibus. *Fæm.* *Perianthium* maris. *Ovarium* inferum, bi-triloculare ; *ovula* in loculis solitaria. *Style* 2-3, basi coaliti, apice bifidi. *Fructus* globosus, medium supra annulatus, trilocularis. *Semina* solitaria, verrucosa-muriculata.

*HABITUS*.—Herbæ scandentes habitu *Cissi*, pilis articulati mollibus pilosæ.—*Cirrhi lateralis*. *Folia pedata, foliolis quinis, mucronato-crenatis serratisve*. *Flores paniculati, minuti* Baccæ pisiformes.

*OBS*.—Genus *Actinostemmati* affinis, discrepans habitu, filamentis monadelphis, forma stigmatum, et structura fructus. An *Cyclantheræ* affinis ?

1. *E. digyna*, foliolis subtus glabris, paniculis molliter et parce pubescentibus, petalis fl. fæm. oblongo-lanceolatis acuminatis, stylis 2 basi coalitis, fructibus pubescentibus.

(a) This æstivation it is proper to remark, occurs in, at least, one genuine Cucurbitacea, see *Trichosanthes tuberosa*, Bot. Mag. t. 2703.



The prominent points of the major part of this sub-family (Zanoninæ), seem to me the membranous, scarcely marcescent, often

HABIT.—Khalamkhet, Jingsha, at the foot of the Mishmee Hills; and towards Deelong, on the Mishmee Hills, alt. 2-3000 feet.

DESCR.—*Herba* tenera, scandens, molliter pubescens. *Petoli* subunciales. *Foliola* subtus glaucescentia, lanceolata, acuminata, crenato-serrata vel dentata cum mucrone, supra ad venas parce puberula, subtus glabra. *Cirrhi* laterales. *Paniculæ* flor. masculorum spithameæ, molliter pubescentes, ramis ascendentibus-patentibus. *Bractæ* subulate. *Flores* racemoso-fasciculati minutissimi; pedicellis subtus florem articulatis. *Parianthium* rotatum. *Sepala* parce pilosa. *Petala* lineari-lanceolata, subulato-acuminata. *Columna* staminum brevis, vix exserta. *Antheræ* subreniformes, longitudinaliter dehiscentes. *Paniculæ* fl. fæm. breviores. *Pedicelli* calycesque pubescentes. *Petala* oblongo-lanceolata, acuminata, undulata. *Stamina* 0. *Ovarium* superum, biloculare, pubescens; *ovula* solitaria, pendula, raphe extrorsa?. *Styli* 2, basi coaliti, bifidi. *Stigmata* simplicia. *Fructus* (immaturus) pubescens.

2. *E. trigyna*, foliis utrinque pubescentibus, paniculis (fructus) dense pubescenti-hirtis, petalis (fl. fæm.) e basi lanceolata subulato-acuminatissimis, stylis 3 basi discretis, fructibus glabris.

*Zanonia* cissoides, wall?

HABIT.—Below Dewangiri, towards Dairang, Bootan Mountains, alt. 1-500 feet. In very shady moist woods, Myrung, Khasiya Hills, alt. 5000 feet.

DESCR.—Habitus præcedentis. *Caules* et *petioli* dense pubescenti-hirti. *Foliola* lanceolata, ecuminata, crenato-serrata, supra parce pubescentia, subtus ad venas densius. *Cirrhi* laterales. *Paniculæ* fructus digitum vix excedentes, denae pubescenti-hirtæ, ramis patentibus. *Pedicelli* subtus flores articulati, dense pubescenti-hirti. *Ovarium* glabrum. *Styli* 3, subulati, bifidi. *Stigmata* simplicia. *Baccæ* pisi forma et magnitudine, apice stylorum reliquiis distantibus notatæ, medium supra annulatæ, atræ triloculares; *epicarpium* subchartaceum. *Semina* solitaria, cuneata, brunnea, muriculata, margine exarata. *Embryo* conformis, plumula conspicua.

OBS.—I have male specimens of a plant of this genus from Darjeeling, which differ materially from those of *E. digyna*, and which I think belong to a third species. The two, now attempted to be established, require to be examined in the living state.

In my Malacca collection occur specimens of a remarkable plant, which appears to me to belong to this sub-family, although its habit is widely different, being rather that of *Menispermæ*.

*Calyx* minutus irregularis, sub 5-partitus. *Petala* 5, acuminibus subulatis incurvis. *Stamina* 5, soluta. *Antheræ* lineares, uniloculares. Rudimentum *Pistilli*.

elongated floral envelopes, the one-celled anthers with ordinary filaments, connectiva and loculi, the generally capsular, annulated, one-celled fruit with simple parietal placentation, and the pendulous\* etunicate seeds. There does not appear to be any peculiarity in the situation of the cirrhi, the particular nature of which is besides unknown.†

It passes I imagine into typical Cucurbitaceæ through *Zanonia*, in which the placentæ are so produced inwards as to meet in the axis, and still more through *Telfaria*, (*Hook.*) in which there appears to be a tendency to the triadelphous stamina, and which is represented as having horizontal and tunicated seeds.

It affords strong evidence against the hypothesis of the structure of Cucurbitaceous fruit advanced sometime ago by Dr. Wight, and which goes so far as to reverse what has hitherto been found to be the constant disposition of the vegetable leaf. For the gradation is complete (through *Zanonia*)‡ between the entirely and simply parietal placentation of *Actinostemma*, and the more complicated, but still parietal, placentation of typical Cucurbitaceæ.

I regret that it has not been in my power to give an accurate Catalogue of the species contained in the Chinese collections. It cannot be too often insisted on, that the usual necessary means of Botanical determination, and which are characteristic of *scientific*

*Frutex cirrhosus, ferrugineo-pubescent. Folia oblongo-ovata, integra, Menispermoides vel Phytocrenoidea. Cirrhi laticaulares. Paniculæ amplæ, folia excedentes. Flores minuti; perianthium utrumque extus ferrugineo-hirtum.*

Affinis *Natsiato* (Ham.); affinis Cucurbitaceis, *Zanonius*. An *Enkylæ* sp.?

\* *Feuillea* is described, (Endl. Gen. p. 934) as having the ovula erect, which probably is an error.

† Compare with this Arnott's character of this sub-family, Lond. Jour. Bot. 3, p. 272.

‡ The structure of the ovary and fruit of *Zanonia* still appears to be unknown. While the ovula are distinctly parietal the placentæ are produced inwards so as to meet in the axis, resembling in a remarkable degree, the very young state of the placentation of *Coccinia*.

The fruit may be thus described. *Capsula* (clavata) unilocularis, infra apicem annulata, apice plano valvis tribus demum inflexis dehiscens; *placentæ* 3 (trigonæ,) magnæ, usque ad axin productæ. *Semina* cujusque placentæ (fol. corpearium duorum) bina, pendula, etunicata, marginato-alata.

Dr. Arnott, I believe, considers the wing of the seed to be of secondary importance. But the common form of the margin of Cucurbitaceous seeds would seem either to indicate the occurrence of no wing, or if any of two. In either case *Zanonia* appears remarkable.

I subjoin a character of the genus.

*ZANONIA*, Linn.—*Flores* dioici; *Masc. Sepala* 3, *Petala* 5, *Stamina* 5, soluta, *antheris* unilocularibus. *Fœm. Perianthium* maris. *Ovarium* (inferum) unilocu-

institutions, do not exist in India, not even in the Public Botanic Gardens. The only way therefore by which I could hope to attach any interest to this paper was, by confining myself to the genera contained in it, which appeared to me either new to science, or imperfectly known.

### EXPLANATION OF PLATE I.

#### IXONANTHES RETICULATA, DODECANDRA.

##### *I. reticulata.*

1. Flowering branch, natural size.
2. Flower.
3. Same, sepals, upper part of stamina, and style removed.
4. Anther, back view.
5. Ditto, front.
6. Pistillum and lower parts of stamina.

##### *I. dodecandra.*

7. Flower.
8. The same, sepals and upper parts of stamina and style cut away.
9. Pistillum, annulus, and lower parts of the filaments.
10. Part of the annulus and three filaments, inner face.
11. Anther, back view.
12. Ditto, front.
13. Pollen, ( $\frac{1}{20}$  triplet).
14. Situation of petals in bud.
15. Stigma.
16. Ovulum.
17. Ovarium, transverse section.
18. Fruit.
19. Same, dehiscent.
20. Seed.
21. Same, longitudinal section.
22. Abortive seed—*a.* body of the ovulum—*b.* funiculus.

lare, ob placentis intus productis pseudo-triloculare. *Ovula* 6, pendula. *Styli* 3, bipartiti. *Fructus* capsularis, vertice plano valvis tribus dehiscens; *placentæ* trigonæ, maximæ, in axi concurrentes. *Semina* marginato-alata.

**HABITUS**—Plantæ *indica*, scandentes, carnosæ, glabræ. Folia indivisa, vel trisecta (Arn). Flores parvi, paniculati, viridescens. Antherarum dehiscencia transversa. Fructus clavatus, subtrigonus, apicem infra annulatus.

**OBS.**—Genus ab aliis subfamiliæ distinctum, *Alsomitra* excepta?, sepalorum aliorum cohesione, placentis intus productis, ovulorum numero, et seminibus marginato-alatis. *Z. Vightiana*. Arn. verisimiliter genere excludenda.





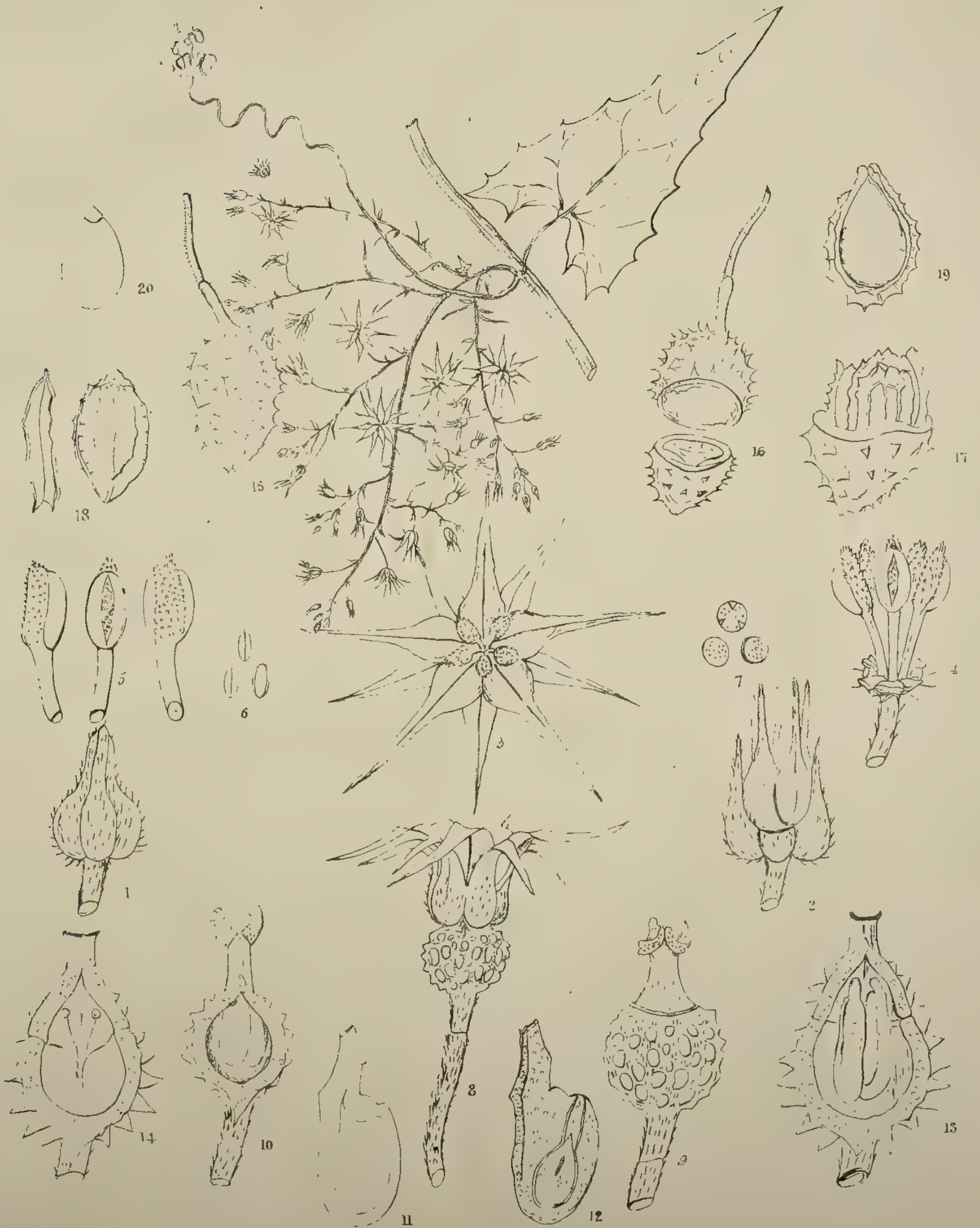
*Ixonanthes reticulata*  
*subdodecandra.*





*Corylopsis grata*





*Actinostemma tenorum.*

## PLATE II.

## CORYLOPSIS GRATA.

1. Flowering branch, var A.
2. Ditto, var. A. (Minza Peeza).
3. Fruit bearing branch, var. B. } Natural size.
4. Flower.
5. Another laid open, pistillum removed.
6. A petal, cut across.
7. Flower, petals removed.
8. Anther, before dehiscence.
9. Anther, during dehiscence.
10. Anther, fully opened.
11. Stamen, and two of the larger glands, sometime after dehiscence, front view.
12. The same, viewed laterally.
13. Pollen, (in water).
14. Pistillum.
15. Same, longitudinal section.
16. Ovulum.
17. Ditto, longitudinal section.

## PLATE III.

## ACTINOSTEMMA TENERUM.

Male Plant, portion of, natural size.

1. Bud.
2. Ditto, anterior sepal removed.
4. Male organs, sepals and petals removed.
5. Stamina ; front, back, and side views.
6. Pollen in the dry state.
7. Ditto, moistened.
8. Female flower.
9. Pistillum, sepals and petals removed.
10. Another pistillum, ovarium cut through longitudinally.
11. Ovulum.
12. Same, longitudinal section.
13. Long section of a young fruit, shewing two young seeds in situ.
14. The same, young seeds removed to shew the placentation.
15. Fruit.
16. Ditto, opened.



17. Upper part of the fruit with the seeds attached.
18. Seeds.
19. Seed, integument half removed to expose the embryo.
20. Embryo.

All excepting the portion of the male plant, from fresh specimens.

#### PLATE IV.

##### GOMPHOGYNE CISSIFORMIS.

##### ENKYLIA DIGYNA AND TRIGYNA.

##### *Gomphogyne cissiformis.*

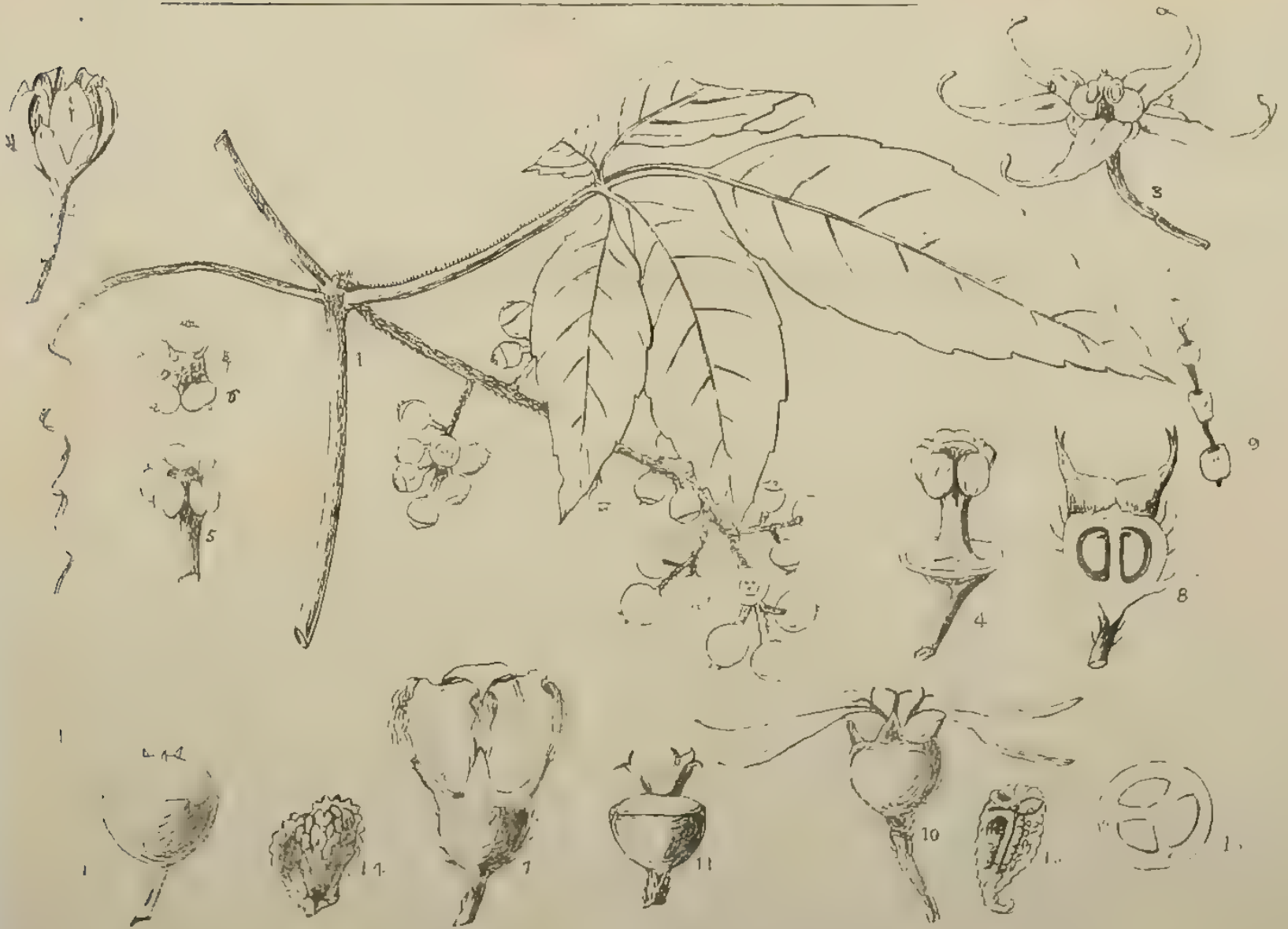
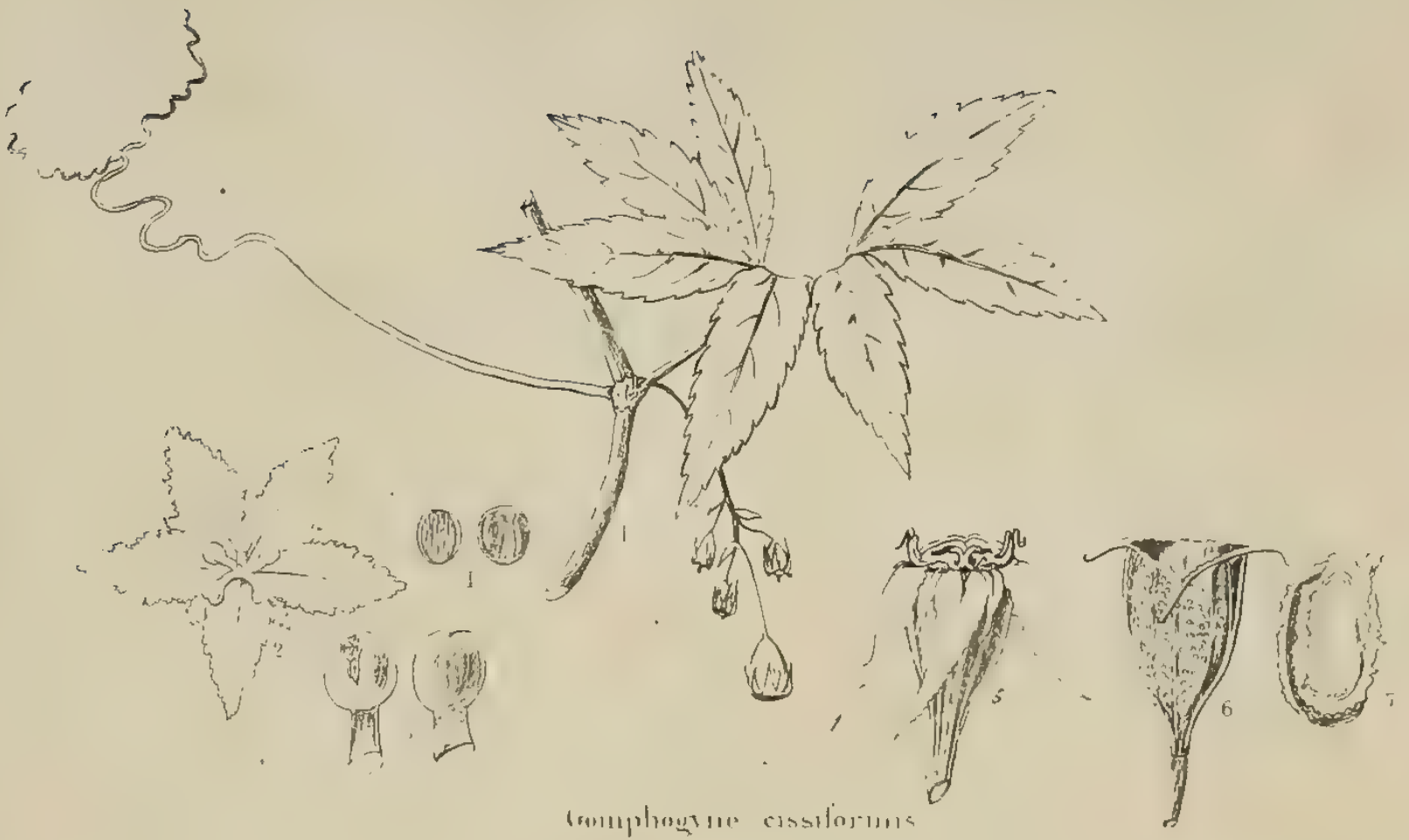
1. Portion of a female plant, from a dried specimen in the Herbarium of Mr. Edgeworth; natural size.
2. Male flower; front view.
3. Stamen; back and front view.
4. Pollen.
5. Female flower.
6. Fruit.
7. Seed.

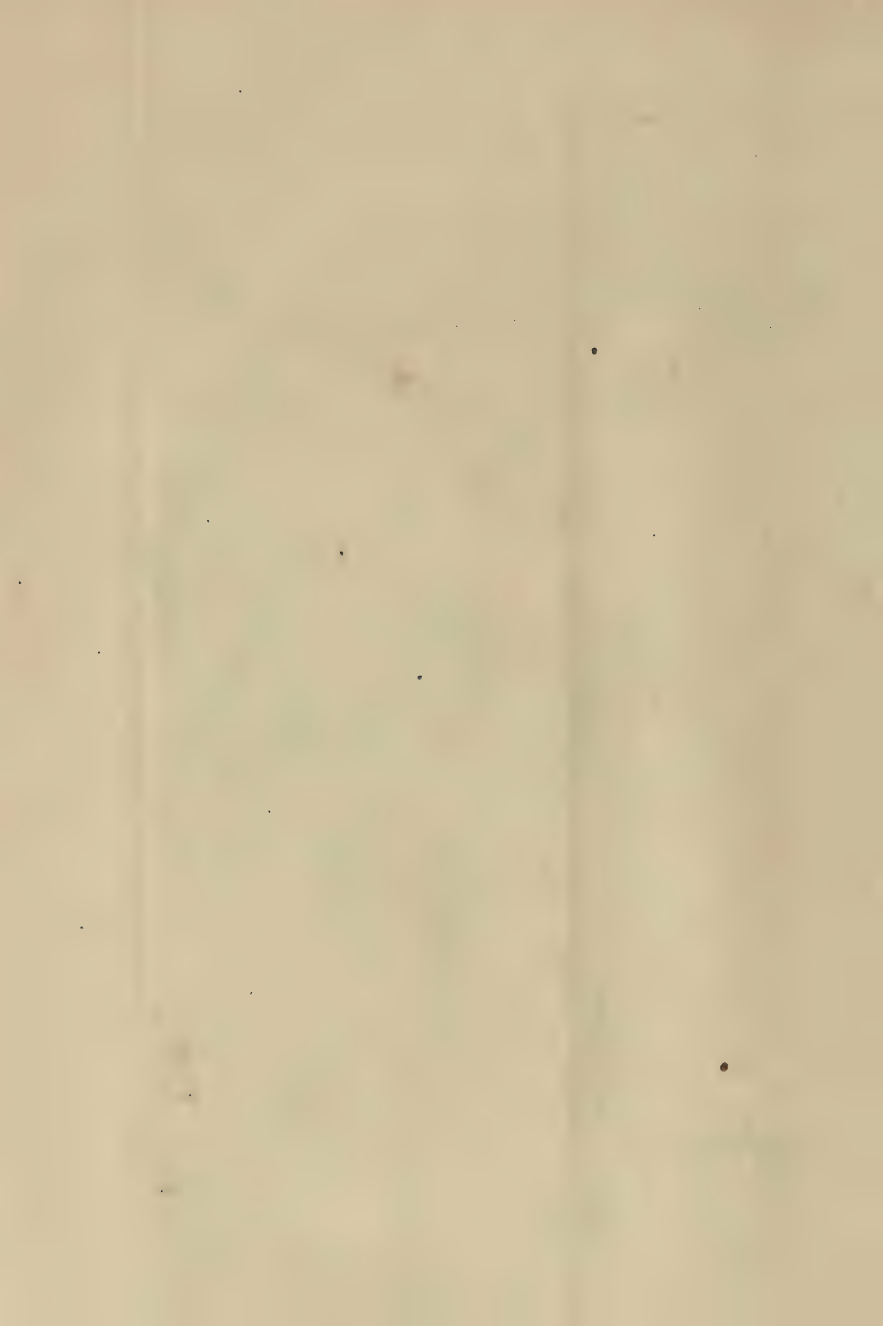
##### *Enkylia digyna.*

1. Portion of a fruit-bearing plant; natural size.
2. Male flower, just expanding.
3. Expanded male-flower.
4. Column of stamens, (base of perianth remaining,) after dehiscence of anthers.
5. Column of stamens, before dehiscence of anthers.
6. Vertical view of the under-face of apex of column.
7. Female flower, just expanding.
8. Vertical Section of ovarium, shewing the pendulous ovula, and the styles united by their bases.

##### 9. *Enkylia trigyna.*

10. Female flower expanded, shewing the long acuminate petals, 3 bifid styles, and smooth ovarium.
  11. Unripe ovarium, bearing the styles.
  12. Ripe bacca, shewing the remains of the three styles, and the annular mark above the middle.
  13. Transverse section of unripe ovarium, shewing three cells.
  14. Ripe seed seen sidewise.
  15. Ditto seen edgewise, shewing the marginal grooves.
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*Notes on the Geology of the Punjab Salt Range, by W. THEOBALD, Junr. Assistant, Geological Survey of India, late of the Punjab Geological Survey.*

The present paper was originally written upwards of three years ago, but has been subsequently revised and curtailed owing to the prior publication of two papers on the same subject, one, a sketch drawn up by Sir R. Murchison from private letters of Dr. Fleming, which appeared in the Quarterly Journal of the Geological Society for August, 1853, and the other the official report of Dr. Fleming, published in the As. Soc. Journ. Nos. 3, 4 and 5 of 1853. From the great discrepancy between these papers, it is certain that the sketch in the Quarterly Journal was published without the knowledge or consent of Dr. Fleming, the theory therein advocated of the eruptive origin of the saliferous rocks, being abandoned in favour of the more mature and correct views set forth in his report to Government. This explanation is due to Dr. Fleming, who in the present instance may well complain of the inconsiderate zeal of his friends at home in his behalf.—W. T.

Before proceeding to describe the Geology of the range, it will, I think, be convenient to give a brief sketch of its physical features and general appearance, particularly as such in a great measure depend on peculiarities in Geological structure. The salt range, which forms as it were a barrier across the upper part of the Sind-Sagur Doab, may be described as a regular and nearly continuous chain of hills, with an included table-land in parts, stretching from the vicinity of Jhilum to Mári on the Indus, a distance of 120 miles in a straight line. A line drawn from Jhilum to Mt. Sakesa, the highest point in the range, nearly indicates the centre of the range between these points, a distance of 104 miles, and bears magnetically  $254^{\circ}$ . From Mt. Sakesa to Mári on Indus, the distance is 35 miles and the range here makes a sharp bend, the magnetic bearing of this portion of it being  $323^{\circ}$ . These two lines of bearing including an angle of 69 degrees, are evidently the result of those forces which originally elevated the range, and the regularity of the upheaval is such, that the three principal hills, namely, Tilla, Karingli and Sakesa are situated on one and the same straight line, nearly; each of them too being thrown up by faults transverse to the main axis of the range and striking N. E. and S. W. The width of the range between Mts. Sakesa and Karingli a distance of 65 miles, is



pretty regular, averaging 10 miles, but at either end towards Mári or Jhilum it is not more than 3 miles, and the transition is somewhat abrupt, and due to the higher inclination of the strata there, causing a corresponding decrease in width. Midway however, between Sakesa and Mári the range acquires for a short distance the width of seven miles.

Towards the east the salt range may be said to commence at the celebrated fort of Rhotás, 10 miles W. N. W. from Jhilum, the fort being built on the end of the hilly ridge or spur which tails off from the N. E. declivity of Mt. Tilla. This hill is 3000\* feet above the sea and forms a grand and imposing feature in the district. It rises abruptly and presents an escarped face towards Jhilum and a very steep slope to the N. W. To the W. N. W. it falls rapidly down and merges into the broken ground which skirts and closes up the range along its entire length to the north, and can hardly be termed hilly though very impracticable and deeply excavated by torrents. The portion of the range now to be considered, between Mts. Tilla and Sakesa is in every respect most important. The first considerable hill west of Tilla is Karingli, distant  $23\frac{1}{2}$  miles from it to the W. S. W. and between which a considerable but very circuitous nulla (the Boonah) winds, traversing the range at this point and falling, near Bhimba, into the Jhilum some 14 miles below the station of the same name. Four miles S. S. E. of Karingli is situated the romantic fort of Kusak; perched on a beetling triangular peak or needle, isolated by denudation from the neighbouring table-land and falling with a sheer and precipitous descent towards the plain to the south, which appears spread out beneath it in almost panoramic order. Between Kusak and Karingli the land forms a kind of flat valley, which may be regarded as the commencement of that table-land which stretches with increasing breadth and elevation to the foot of Mt. Sakesa. At its eastern end this table-land is not more than 2200 feet above the sea at most, but towards Sakesa it continuously rises to about 2600 feet, bounded to the

\* For my general ideas respecting the height of the range I am indebted to W. Purdon, Esq. who was at considerable pains to check the few Barometrical observations by the boiling point and by angular measurements where practicable, though from such scanty and disconnected data, approximation is all that can be expected.

north and south by skirting ridges of 200 feet or to greater elevation. These ridges frequently anastomose and give rise to several parallel vallies which need not be specially dwelt upon. Mt. Sakesa, the most considerable hill in the range, is fully 5000 feet in height, but its position among other hills of considerable altitude greatly diminishes the appearance it would otherwise make. It is thrown up across barrier-like and cuts off the table-land which terminates at its base, and to the south graduates into the confused mass of hills called the Patial hills, many of which must be fully 3000 feet high. As previously mentioned, Mt. Sakesa is thrown up by a N. E. to S. W. fault, the beds dipping at a variable but high angle to the N. W. This fault has evidently brought up the saliferous marl to the surface as at the S. E. base of the hill a large salt lake is formed though the salt marl is not fairly seen. A salt lake is also formed in a similar manner, by the saliferous marl being brought to the surface by a fault at Kalla-Kahar, 18 miles due west of Karingli, where however, the fault is not clearly seen, though the marl is pretty plentiful. The Sakesa fault is however, well marked and causes a vertical displacement of strata of certainly 1000 feet and perhaps more. From Mt. Sakesa the range makes an abrupt bend to the N. W. and consists of numerous knife-like ridges, the strata constituting which, are thrown up at a high angle, vertical in places, thereby decreasing the width of the range, to which cause the effects of denudation must be added, which are very forcibly exhibited near Musakhel, twelve miles W. N. W. from Sakesa, situated in a deep bay eaten out of the hills, which at that point are not more than one mile across and perforated by a considerable nulla, that flows from the north and during rain discharges itself into the Indus. To the north along its entire length, the range is bounded by an arid and uninviting tract of broken ground with which it becomes blended and throughout which villages and water are scarce. To this last want rather than to the unkindly nature of the soil, must be attributed the general sterile aspect, as at a greater distance from the range where water and open space are procurable, large villages and tolerable crops attest the capabilities of the soil. Along its southern boundary the range presents much bolder features, being on that side cut off along nearly its entire length by either a

fine escarpment or by a range of huge craggy buttresses, formed by the detachment and subsidence en masse of great slices of the hard upper strata (limestone) of colossal dimensions. Below these again tail off moraine-wise streams of stony debris resulting from the destruction of the various beds of the range; which, when viewed from the plains, represent an interminable series of headlands and promontories, and all the characteristic features of an exposed rocky coast. So evident are the means to which this appearance is due, that the mind almost unconsciously dwells on those fine lines of Shakespear descriptive of a similar scene in a far distant land, and when standing on the verge of the escarpment, one is forced as readily acknowledges their applicability to the scene beneath, as though a mighty ocean still, as of yore, rolled its waves over the land of the five streams.

“ Stand still.—

How fearful

And dizzy 'tis to cast one's eyes so low !

The crows and choughs, that wing the midway air,

Shew scarce so gross as beetles : the murmuring surge,

That on the unnumbered idle pebbles chafes,

Cannot be heard so high.”

As I shall again refer to the physical features of the south side of the range, I will now briefly notice the salt mines. The principal Cis Indus mines are situated at Kiura, six miles north from Pind Dádan Khán and fifty miles from Jhilum, other mines exist near Surdi, Makraj, Varcha, &c. and indeed wherever the saliferous marl is largely developed, but a description of one will suffice, as Kiura mines merely differ from the rest in size and importance. The village of Kiura is situated up one of the gorges, which are so numerous along the southern side of the range, and is built on the tail of the hill in which the mines are situated. The two most important mines (neglecting the Makad and Farwára mines) are the Sujuála and Baggi, which last is a small ill-ventilated mine, the salt from which is a favourite with the merchants, though without any good foundation for the preference shewn it. The road to the Sujuála mine (some twenty minutes walk from the village) is carried along the side of the hill, and rises considerably to the mouth of the



mine. The gallery leading into the mine is very steep as may be imagined by the fact of part of the chamber where the salt is worked, being immediately under the external entrance. The gallery, which is partly natural, partly artificial, passes through marl and gypsum, and averages six feet by three. The form of the mine is an irregular oval, 400 feet long and from 60 to 160 feet broad. The height is probably not less than 35 feet, though this is a mere guess. The floor slopes considerably from the entrance and the brine which percolates through the mine collects along the sides, forming pools, which, by the faint light of the lamps, have a very stygian and doleful aspect. What the thickness of the salt is, it is impossible to ascertain, but some idea of its extent may be formed by the fact of several mines being excavated at different levels in the crystalline salt, each capable of containing a very decent sized house. It by no means, however, follows that the difference of level between the mines necessarily affords any indication of the thickness of the salt, as the whole of this vast bed has been faulted and displaced in the most extraordinary manner.

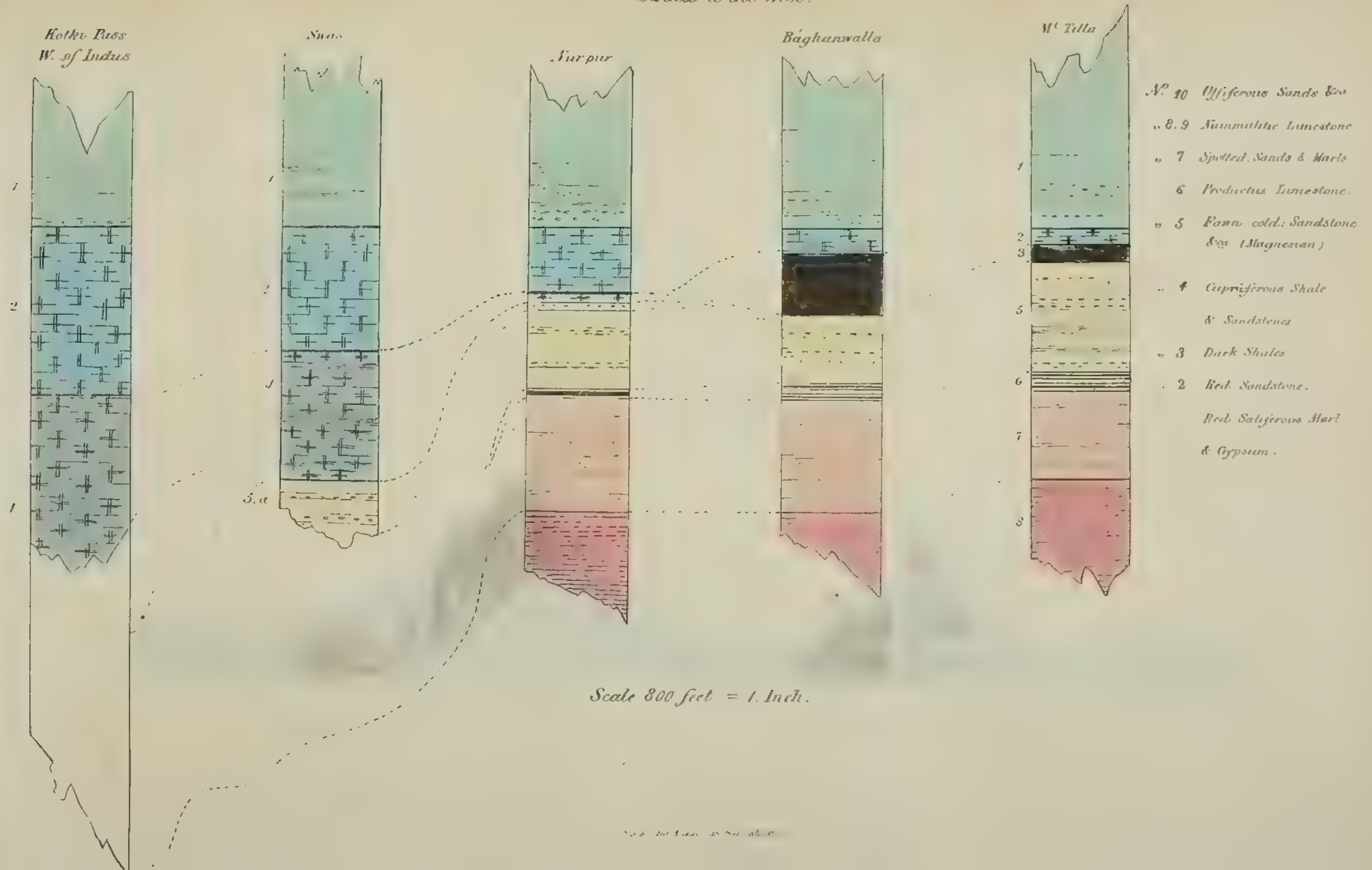
I now come more particularly to the Geology of the range and should here premise that I have no wish to institute any comparison between the deposits in the Salt Range and similar ones in Europe. The great and interesting problem of geological identity I leave to abler hands and trust that ere long, the collections of fossils forwarded to Europe will have gone far to clear up all doubts on the point and to settle definitely the age of the rocks under consideration. I will add however that regarding the mere lithological characters of the strata, it would not be difficult to identify almost every bed of the permian and saliferous rocks of Europe, in the beds of the salt range, inferior to the nummulite limestone, but in an inversed order to what they present in Europe. In taking a general view of the Geology of the salt range, the question that first of all presents itself is, "What has become of the other half of the range and the rest of those sheets of solid rock, the abrupt and broken edges of which, constitute the escarped and rugged southern margin of the range from Mári to Bhotás, from the Jhilum to the Indus?" This question, though presenting few difficulties to the Geologist, is far from uninteresting, and a brief glance may here be taken at the



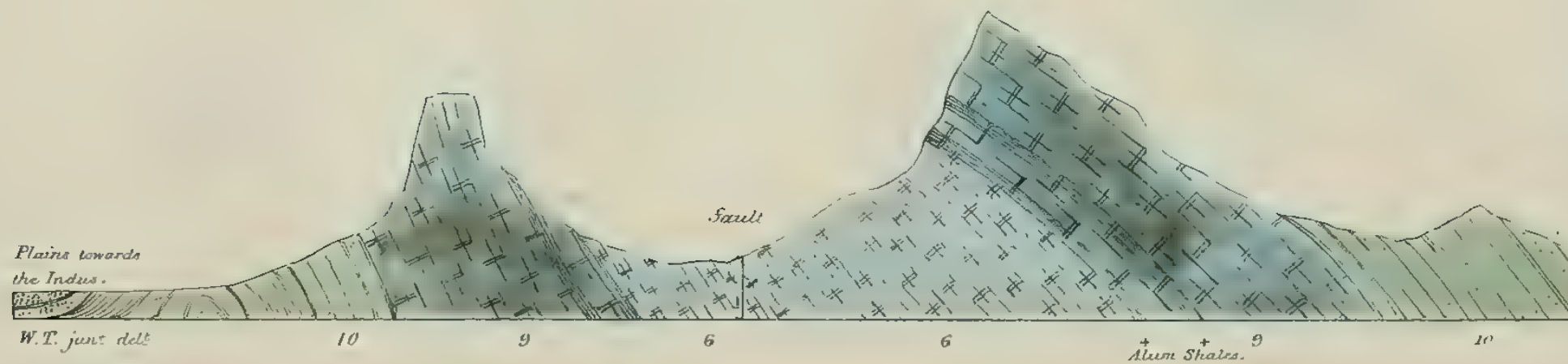
state of things which preceded, and the agencies which resulted in, the formation of the Punjab Salt Range as we now see it. As the entire series of rocks under consideration are conformable, from the lowest red marl to the uppermost tertiary bed, it will merely be necessary to imagine, in order to form some idea of the formation of the range, that state of things which existed during the deposition of the uppermost bed of the tertiaries, and which immediately preceded the operation of those forces which led to the upheaval and present form of the range. That radical changes have been constantly in action is not less certain, than that such changes never existed in greater degree, than during the most recent periods of geological history—even confining the observation to the Salt Range. The upper or nummulite limestone, having a close resemblance in many points to the chalk, was without doubt deposited in a similar manner in an oceanic basin, which gradually filling up induced a condition favourable to the deposition of the upper sands and marls which are of an extremely recent (geological) date. These beds are doubtless shallow, estuary or lacustrine deposits, containing as they do, not more than three or four species of shells, (two being a kind of mussel and traces of a univalve or so) but an immense quantity of teeth, bones, and other exuvæ of mammalia, crocodiles, tortoises, &c. with fragments of fossil wood and even trunk of trees. Subsequent to the deposition of the earlier beds of these deposits, a gradual subsidence must have occurred, as is proved by the immense thickness of these shallow-water strata, the minimum thickness of which cannot fall below 10,000 feet and probably exceeds double that amount. It is pretty safe to assume that these are identical with the Siwalik tertiaries, but their range to the north, north-west and west will for many years probably, remain unknown, as however they pass into the underlying nummulite limestone, they will probably be found to extend at least as far as that rock which is known to be largely developed throughout Afghánistan. We may now suppose the whole of the tertiaries deposited, and by the continued sinking of the land, covered by the waters of the ocean—for without such an agent, it is difficult to account for the removal of such vast sheets of strata as have every where disappeared, or the formation of that line of cliffs previously described. We should otherwise see

*Estimated Vertical Sections. shewing the great development of some  
Strata to the West.*

PL XXVIII



*Inverted strata in the  
Churhali Pass, West of the Indus.*



the highest land entirely composed of tertiaries, for what mere atmospheric forces could possibly denude 10,000 feet and more of sands, marls and conglomerates; and even deeply excavate the underlying solid limestone—or where could such agency alone dispose of the debris? It may I think be legitimately allowed that when the first elevatory forces were felt along the axis of the range, the whole, in extended sheets constituted the bottom of an ocean. The force of currents would naturally act with peculiar power on a narrow and elevated ridge of soft strata, and the greatest amount of denudation, possibly occurred previous to their summits emerging above the surface; when however an extended line of coast was raised, the breaching power of the waves could effectually act on the harder strata, and proofs of this power are every where abundant through the range. The table-land often presents a series of vallies excavated in the tertiaries and upper limestone, all discharging themselves to the south over the escarpment or at the head of narrow gorges which enter the range, and which, in many instances, seem to have been excavated backwards in the manner of the well-known Niagara falls, by forces no longer existing. This series of vallies is exactly imitated on a small scale by the channels cut by the retiring tide in a stiff mud bank. A short description of the different beds, is now all that remains to add as a glance at the sections appended to this paper will give an idea of the geological constitution of the range more readily than any long verbal description.

The following are the most important beds in the range with their maximum estimated thickness (ascending).

|        |                                                                          |       |
|--------|--------------------------------------------------------------------------|-------|
| No. 1. | Red marl and gypsum with rock salt, .....                                | 1,500 |
| 2.     | Dark red sandstone, fine-grained with black iron-sand partings, .....    | 700   |
| 3.     | Dark arenaceous shales with green earth, .....                           | 250   |
| 4.     | Cupriferous purple shale, and red friable grits and conglomerates, ..... | 400   |
| 5.     | Hard fawn-coloured sandstone with bands of conglomerate, .....           | 700   |
| 6.     | Lower or (productus) limestone, .....                                    | 1,100 |
| 7.     | Red and green white spotted shales and sandstones, .....                 | 600   |



|                                                                                                                                |        |
|--------------------------------------------------------------------------------------------------------------------------------|--------|
| 8. Carbonaceous shales, sandstone and lignite, .....                                                                           | 80     |
| 9. Upper or Nummulitic limestone, .....                                                                                        | 1,100  |
| 10. Nummulitic limestone conglomerate, green, red and<br>yellow ossiferous sands, marls, and conglomerates<br>(minimum), ..... | 10,000 |
| <hr/>                                                                                                                          |        |
| Total, ....                                                                                                                    | 16,430 |

Although the aggregate thickness of the strata in the range, cannot be estimated at much less than 6500 feet, yet two or more strata are rarely fully developed at the same point, and the thickness of the different strata vary very considerably at different parts of the range. Thus at Mt. Tilla the upper limestone and spotted sands are each only about 100 feet thick, the maximum thickness of the first rock not being attained before crossing the Indus, the lower limestone is not met with at all, and the fawn-coloured limestone, here largely developed, is soon entirely lost towards the west.

No. 1. Red marl. This formation, for it deserves the name, is largely developed along the entire southern base of the range with occasional exceptions towards either extremity, and is here and there brought to the surface by faults within the range itself, as previously described, at Kalla Kahar, Mt. Sakesa, and doubtfully at some other spots. The colour of the marl is usually a dull crimson red, inclining to plum colour, or purplish towards the upper part where by the intervention of a few arenaceous bands, it passes into the overlying sandstone. It is sometimes met with of an extremely florid colour which seems to be especially the case in the vicinity of trap as in the Kiura gorge and the shoulder of Karingli. The only minerals found in it are small rock crystals, usually marled and imperfect, which occur plentifully at Mári on Indus and Kála Bágh, and sparingly near Nurpur and Sardi. Iron pyrites is also found in small quantities in the gypsum at Sardi and elsewhere. Gypsum occurs in the marl in thick beds evidently stratified, also in thin seams and foliæ, and in large lumps and blocks, but the latter form, is I think, merely the result of the beds of gypsum breaking up and the fragments becoming impacted in the soft and yielding marl by pressure and the movement *en masse* of the lower strata. The handsomest variety of gypsum is the pure white or pink saccharine

kind. It also occurs coarsely crystalline of a greyish white colour, there is also a compact grey kind, but large blocks of the best kinds are not readily got. The ordinary gypsum is greyish white mottled, and varieties occur of various shades of red, brown, and greenish. Small crystals of selenite are also abundant in the marl, which owes its preservation from being washed away in a great measure to this mineral. The gypsum and salt appear to occupy a high position in the marl, but it is difficult to assign them any particular place. The salt occurs in strata of about two feet or more in thickness, separated by a thin parting of red marl, of not more than half an inch, so that the entire body of salt may be regarded as one band of probably not less than 100 feet in thickness. The upper and lower layers of salt decrease in thickness while the partings of marl are proportionately enlarged, and contain coarse granules of salt, so that a blending occurs between the crystalline salt and the red marl which greatly opposes any attempt to examine their junction. The salt is, I believe, in one great band only, but the dislocations which the red marl has suffered, have so broken up the original bed and so altered the levels of the disconnected portions of the sheet, that much obscurity unavoidably exists on this point. The surface planes of the beds of salt are quite parallel and smooth, abruptly terminating and cutting off the cubes of which the bed of salt consists. These cubes dissected out by the action of water in the mine, and standing in high relief, form a really beautiful object when lighted up by the miners' lamps, and the salt even in large blocks possesses a very mild and pleasing translucency. Fractures in the salt usually occur transverse to the bedding, and it is common to see in the mines and galleries, huge cubic fragments depending as it were from the roof as though arrested in the very act of falling. These fragments frequently move, and are arrested before finally coming down, the salt which crumbles from their sharp edges giving timely warning to those beneath. This, together with the fact of the mines being deserted during the most dangerous part of the year (the rains), accounts for the paucity of serious accidents among the miners, who in most instances are the victims of their own carelessness. Most of the falls, oddly enough, seem to take place at night. *In no part of the red marl, have I ever observed a fragment of any foreign rock*

*or fossil of any description.* One curious exception however, must be mentioned, which is the occasional occurrence of small angular fragments of trap at Kiura and elsewhere. The trap is the same that occurs altering the marl in various parts of the range, and every fragment is enveloped in a thin coat of fibrous gypsum, which has evidently separated from the marl and ranged round the trap nucleus as a centre. This gypsum coat is not one-twentieth of an inch thick and the fragments of trap vary from the size of a pea to that of an apple. In the lower part of the red marl occur a few thin bands of a fine compact argillaceous shale and fine argillaceous sandstone, having a few dark filmy partings of a black colour and seemingly carbonaceous character. The shale is compact of a peculiar ashen colour and contains crystals of selenite, which in parts being decomposed give this curious rock a singular honey-combed aspect. The sandstone is fine and thin bedded in the extreme, the strata resembling in arrangement sheets of paper, but the whole is firmly cemented by infiltrated selenite, the crystals of which, form partings between some of the beds and impress a peculiar character on the whole. These beds are singularly contorted, for instance on the left hand side entering the Kiura gorge, and though of very insignificant thickness (some few feet) appear traceable wherever the red marl is much developed.

No. 2. Red sandstone. Above the red marl occur several feet of dark red thin bedded marly sandstones, forming a link between the marl and superincumbent sandstone. This sandstone is greatly developed throughout the range, more so if any where, towards the eastern end where it is fully 600 feet thick. Its colour is dark brick or plum red, and it is generally thin bedded. The upper beds become grayish white, and white and red, but retain the same fine uniform character as the lower. This stone is much used for building, owing to the facility with which it splits into slabs of the required thickness, but is rather soft and its applicability thereby decreased. It absorbs water also readily and is sometimes subject to a saline efflorescence. The pale upper beds, or freestones, though less fissile, are not so faulty in either respect. The red sandstone is rarely, if ever, seen ripple-marked, but the atmospheric action creates curious rugosities in the surface of some of its beds,



dependant seemingly on the varying density of the stone. Throughout this sandstone not even a pebble is observable, but above it occurs a conglomerate from one to six feet in thickness. The paste, which is very scanty, is a greenish arenaceous clay and the pebbles are from the size of a nutmeg to that of a melon, most being of a large size, and consisting of porpheries and primitive rocks well rounded and polished.

No. 3. The beds above the red sandstone consist of a series of sandstones and arenaceous shales about 200 feet thick and pretty generally developed throughout the range. The prevailing colours are gray and green, the shales containing much green earth and indistinct carbonaceous markings.

No. 4. Cupriferous shale. This deposit though rather locally developed, is one of decided interest. It consists chiefly of a purple clay containing granular concretions of copper ore, and of beds of sandstone and conglomerate of a peculiar character also containing traces of copper. The formation does not extend much farther east than Nurpur, from whence it can be traced to within some ten miles of the Indus. The characteristic purple clay is more circumscribed and is best seen in the vicinity of Kata and between Kata and Musakhel. The lower beds consist of shales and sandstones, of some thickness, then comes a bed of shale containing abundantly balls of radiated sulphate of barytes, and some curious sintery concretions, above this occurs a purple greasy looking shale the most characteristic bed of the whole, and lastly a series of sands and conglomerates fully 250 feet thick in places, and usually forming half or more of the entire deposit. These arenaceous beds are composed chiefly of the sharp sand of granitic rocks and not unfrequently contain crystals of felspar imparting a porphyritic aspect to the sandstone. Some beds indeed so resemble a granitic compound that in hand specimens, they might readily be taken for such. This is especially observable at Nurpur, where some trappean sublimation has penetrated the pores of one of these beds, which presents the appearance of any thing but a sandstone. The conglomerates do not usually contain very large boulders, but are rather coarse grits of a prevailing red colour with an included pebble here and there. Some of the beds afford unquestionable indications of the simul-



taneous existence of volcanic forces in the vicinity, and the following passage from Lyell's *Elements of Geology* is extremely applicable to the beds in question ; it occurs at page 481, treating of the trap of the new red sandstone period. "Some beds of grit mingled with ordinary red marl RESEMBLE SANDS EJECTED FROM A CRATER, and in the stratified conglomerates occurring near Tiverton are many irregular fragments of trap-porphery, some of them one or two tons in weight intermingled with pebbles of other rocks. These angular fragments were probably thrown out from volcanic vents, and fell upon sedimentary matter then in course of deposition." The pebbles in these beds are porpheries, granite, trap, and some of the harder schists, most of them like the Tiverton sands appearing to have passed a fiery ordeal and bearing traces of its action. The copper ore, rather rare in these grits is somewhat more abundant in the purple shale. It occurs in small nodules rarely larger than a pea and is quite insignificant in an economic point of view. The following is an analysis, by Dr. Fleming, of a specimen of the ore from Musakhel, published in the *Delhi Gazette*, 1850.

|                          |         |
|--------------------------|---------|
| Copper, .....            | 75.830  |
| Sulphuret of lead, ..... | 3.155   |
| Sulphur, .....           | 21.000  |
| Iron antimony, .....     | a trace |
| <hr/>                    |         |
| Total,.. ..              | 99.985  |

Dr. Fleming is however, mistaken in naming limestone as the matrix, and was probably misled in this point by the party who furnished him with the specimen.

No. 5. Above the copper shale and perhaps alternating with it occurs a series of sandstones and conglomerates forming an important group. They are mostly highly silicious but some soft beds occur in them. The most remarkable bed is a light coloured extremely hard sandstone weathering of a fawn colour. In the weathered state, some beds so resemble limestone that they have been mistaken for it by, I believe, every one who has treated of the geology of the range, and I was myself under the same impression for some time. It frequently occurs brecciated and cavernous, with seams of carbonate of lime and stalactites in the fissures. It

attains its greatest development at the east end of the range near Baganwalla and Kusak, dwindling away thence westward. The summit of Mt. Tilla and Mt. Karingli and much of the highland near, is of this sandstone. In it occur subordinate beds of a dark blue-grey variety, very hard and silicious, and bands of conglomerate. The boulders in these last beds are granite, porphyry, &c., some few being nearly a ton in weight, and all well rounded and polished. The paste is a sandstone or shale, but some of the finer conglomerates or rather grits are united by a silicious paste, as in some English pudding-stones. The paste of some of these beds and of some of the sands, much resembles chert, and appears to be a chemical deposit. The bands of conglomerate are dispersed irregularly throughout the deposit, and are rarely more than two or three feet thick.

No 6. Lower or productus limestone. Above the last described beds, occurs a series of limestones of great thickness, which may be termed the lower, in contradistinction to the upper or nummulitic limestone. It is first traceable to the east near Nurpur and thence gradually thickens towards the west, till it attains its maximum development across the Indus in the Kotki pass, ten miles N. W. from Kála Bágh. The series consists of limestones compact and thin-bedded, with some subordinate arenaceous and shaly beds intermixed. Their arrangement is somewhat complicated and obscure at different points, but the following brief sketch will convey a tolerably correct idea of the whole. The lowest division consists of

a. An insignificant deposit of sands of variable thickness: above which occurs

b. A deposit of limestones of various characters, fully 600 feet thick: lastly.

c. A series of sands, shales and limestones, of about 500 feet in thickness.

a. The only remarkable bed in this division is a coarse silicious sandstone, with some calcarious matter and carbonaceous stains and bits of lignite. Its colour is a pretty pure white, and in appearance it resembles some of the Fontainebleau sands.

b. This is a most important division, and comprises a variety of limestones mostly highly fossiliferous. The prevailing colour is a dark or light grey, the beds being usually compact, thick-bedded, and contain-

ing numerous fossils. (*Terebratula*, *productus*, *spirifer*, *orthis*, &c., with corals tubular and retiform, and bones of fishes.) The beds in which these fossils are most numerous are thin beds of a shaly character, but they also occur in the most compact limestone. These lower limestones are much fissured, the cracks dividing fossils as neatly as could be effected by a saw, and the surfaces being often re-cemented by pure white calcspar. Above these dark limestones occur several light yellowish limestones abounding in encrinites. The most common colours are greyish, white or yellow, and some of the beds would yield an excellent and beautiful marble. The very yellow varieties, however, seem rather soft and impure, owing their colour to the presence of argil and iron, and weathering into irregular holes filled with a ferruginous yellow clay. The fossils in this limestone are not numerous, with the exception of encrinites, and these are frequently obliterated by the crystalline character of the stone.

c. The third division is represented in the salt range by a series of sandstones and arenaceous shales with a few beds of limestone. The sands contain much iron and are of a reddish or yellowish white colour, a few traces of plants being all the fossils they contain. At Kotki, however, ten miles N. W. from Kála Bágh, this division is fully as thick as the lower, and besides shales and sandstones contains many thin-bedded limestones, some of them oolitic in structure. The most interesting bed is an arenaceous shale of a very peculiar brown or greenish-brown colour. This bed altogether is not much less than 100 feet thick, and contains the bones and teeth of some large saurian (?), the remains of a few crustaceans, and some five or six genera of bivalves including a *gryphæa*; but the most numerous fossils are belemnites, which in places are absolutely more in bulk than the including matrix. They swarm by myriads, and are accompanied by a few ammonites, usually in a bad state of preservation, whilst the belemnites are in the most perfect state possible. The fossils in this bed (except the belemnites, which occur throughout,) are not found indiscriminately but usually associated, so that one or two species constitute a marked band, though the lithological character varies but little. The lower part alone contains fossils; the upper half being quite devoid of them, even of belemnites. The bones in this bed are rather friable, but not ill-preserved; and the



teeth, though brittle, are pretty perfect: one I noticed that, when perfect, could not have been much under five inches in length: these teeth are conical, black, and finely striated. This interesting bed is high up in the series, and might perhaps be advantageously separated from it. The other beds met with at Kotki are sandstones of the character previously described, and a great deposit of thin-bedded limestones. Many of these are devoid of fossils; others again are quite shell-limestones, consisting of broken and undistinguishable fragments of shells, some few having an oolitic structure. Here also occurs a very curious band, some six inches thick, of oolitic limestone passing into shell limestone. To the eye it appears like a brown sandstone; but when examined with a glass is found to consist of an infinite number of globules less in size than those precious pills, which many in these enlightened times find small difficulty in swallowing. These globules have a lustre like burnished gold, and some are finely tarnished. They are unaffected by an acid, which dissolves the calcareous cement by which they are united; and appear to be a peculiar indurated clay, though I am unable to speak confidently regarding their composition. One curious point regarding this series is the suddenness with which fossils appear in it, none of any description to my knowledge being found beneath it; yet in its lower beds several species occur of *Terebratula*, *Orthis*, *Productus*, *Spirifer*, &c. with several corals, bones and teeth of fish, &c. Higher up encrinites abound, with chambered shells, nautili,\* ceratites, &c., and higher still (trans-Indus), *Gryphæa*, with ammonites and belemnites in abundance.†

\* Vide Dr. Fleming's Report, J. A. S.

† As regards the existence of ceratites and orthoceratites in the same band, I am in the last degree sceptical. Throughout the range or even Trans-Indus, I have never seen an orthoceratite; though that is no proof that they may not be found: but some of the belemnites are so large that their chambered portion might readily, under some circumstances, be taken for part of an orthoceratite. But this explanation is unsatisfactory, as belemnites are rare (if they occur at all) in the ceratite beds, and they are certainly most common in the bed previously described as high in the series at Kotki, and they are rare in the range. Yet the ceratite beds are also high in the series, and this view seems to me worth attention, as long as there remains any doubt whether orthoceratites occur or not. While on the subject of belemnites, I may relate a curious use which has been found for them in these parts.



No. 7.—Above the limestone last described occurs a considerable deposit of spotted sandstones and marls, about 700 feet in thickness or less. This deposit is rather circumscribed, occurring only towards the east end of the range. At Mt. Tilla it is seen about 100 feet thick, but soon attains its maximum development at Bághanwalla, after which it is soon lost to the west. The prevailing tints are red and green. The sandstones are generally a full pinkish red with round white spots, from a quarter of an inch to an inch or more in diameter, they are of moderate hardness and much used for currys-stones and similar purposes. The marls occur red and green, spotted like the sandstones, and present faint marks and casts, as of annelidous animals: no fossils, however, are found in any of the beds. A curious appearance is seen in some of these beds. Many of the sandstones are separated by marl partings, and from their surface crystals are often seen half projecting into the marly layer. These crystals are cubes, with depressed pyramids occupying the face of the cube; their usual size is a quarter of an inch, some even so much as one inch, and they frequently occur marled. They consist of sandstone, and the hollow faces of the crystals are only seen when the marl enveloping them is removed, when they stand out in relief, studding the surface of the sandstone like so many crystals of bay-salt. All of the beds of this division are much ripple-marked, and the sands and marls alternate pretty regularly.

No. 8.—Beneath the upper or nummulitic limestone, and above the last described sands, occur a few sandstones which are uniformly developed throughout the range. The most characteristic bed is a sandstone of not more than 25 feet in thickness, rather friable and

From an early number of the *Englishman* of 1851, it would appear that a large number of these fossils, many maunds in weight, were collected to serve as fuel for the Indus steamers at Kála Bágh. The mystery how belemnites could possibly be mistaken for coal might long have remained unsolved, had not the above statement elicited an angry explanation in another Journal; by which it appeared, that in the orders issued for the discovery of coal, the Persian word for that mineral was mistaken for a somewhat similar one in the same language signifying "*finger*," and the natives accordingly thought that the fingers or belemnites so plentiful on the hills were the objects required, though the uses to which they would be applied by the Feringhis, or the means of rendering them suitable for fuel, must ever have remained a subject of profound and hopeless speculation.

of a whitish colour with carbonaceous markings. This bed is, however, usually associated with carbonaceous shales and lignite of very variable thickness. The deposit is most remarkable for affording the so-called "coals" of the range, to wit, the above carbonaceous shales and lignite. In no part of the range is any fuel that can possibly prove of economic value. The following extract, from a report I submitted on the Bághanwalla "coal" will, I think, confirm this view; that being the only place where there is the least approach to a regular seam.

"Para. 3.—Having satisfied myself as to the state of the road, I commenced working into the face of the seam of coal on the west bank of the nullah, in which it is exposed; but found the quality deteriorate, and, on the third day, the coal had so thinned out and was so earthy, that I relinquished the spot, and recommenced on the east bank where previous excavations had been made, but which was less eligible, as the face of the seam there forms the bed of a transverse gully, which would with difficulty during rain be prevented from filling the works with water. The coal from this spot is as good as the seam affords, and some hundred maunds may be readily obtained by superficial digging."

I may also add that, after lying some time exposed, the whole of the coal mined might be easily screened through a  $\frac{1}{2}$  or  $\frac{1}{4}$  inch sieve. This seam is more free from sulphur (iron pyrites) than is generally the case, and also is associated with small crystals of selenite. The following is a comparison of the Bághanwalla and Kála Bágh lignites.

Volatile matter per cent.

|                                                                                                     |    |
|-----------------------------------------------------------------------------------------------------|----|
| Portion of a large lump of Kála Bágh lignite, colour black, and seemed free from pyrites, . . . . . | 53 |
| Bághanwalla lignite in coarse powder, colour brownish-black, . . . . .                              | 34 |

The position of the Kála Bágh lignite is somewhat different from that in the salt range proper. It occurs indeed beneath the upper limestone, but is a part of that series, as may be seen by the following section:

Section of alum shales at Kotki (Trans-Indus).

No. 8.—Soft yellowish sandstone containing the lignites of the range,..... 25 ft.

No. 9.—Carbonaceous shale, (alum shales,) containing the Kála Bāgh coals,..... 25

„ Nummulitic limestone,..... 60

„ Carbonaceous (alum) shales, with nummulitic limestone bands,..... 80

„ Nummulitic limestone,.....

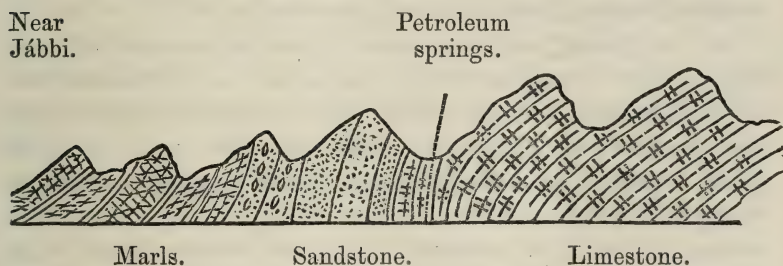
As these beds are merely indicated in the range, the manufacture of alum is confined to the west of the Indus, for which Kála Bāgh has long been celebrated. The supply of shale or “rol” is quite exhaustless, and is obtained by cutting shafts and galleries into the outcrop of the beds. These workings sometimes ignite spontaneously, and the combustion proceeds very actively, owing to the large amount of jet and carbon in the shales. When at Kála Bāgh I entered one of these miniature volcanoes, and accidentally selected the *upcast* shaft as my way out; my sufferings in which should act as a warning in future to visitors to the mines: for I can fancy few less pleasant ways of entering into or quitting the world, as the case may be, than through this dread Avernus.

No. 9.—Nummulitic or upper limestone.—This limestone is one of the most important and extensively developed rocks in the range; occurring throughout its entire extent, and forming the greater portion of the table-land and the summit of Mt. Sakesa. It is first seen at the north-west base of Mt. Tilla, but is there not more than 100 feet thick; thence it rapidly becomes thicker, but is not more than 800 feet thick anywhere in the range. At Kotki, however, the thickness is not under 1100 feet, including the shaly associated beds previously mentioned. The prevailing colour of the rock is white and whitish-grey, much of the compact kind being pink, and some of the softer beds are yellow. A few argillaceous and dark bituminous bands occur, but the general character of the rock is pretty pure. Flints are common, generally as nodules, like the English chalk flints, and in strings; but towards the west end of the range and across the Indus the flint also occurs in strata or plates.\*

\* I should previously have mentioned that an impure flint or chert of a yellowish colour occurs sparingly in the lower limestone.



The nodules are generally of a cherty character and of a pinkish or white colour, but towards the west they acquire a dark grey colour or even black, and were formerly largely used for the Seikh muskets, though tougher than good English flints and more splintery besides. The whole limestone is extremely fossiliferous; abounding in nummulites, and many species of bivalves and univalves of a very modern character: shark's teeth and echinoderms are also not uncommon; but no corals are seen, neither are any fossils common to the upper and lower limestones, though in places separated by only a few intervening beds. In this limestone sulphur occurs and petroleum, at a few places at the west end of the range. The most considerable flow of petroleum takes place at Jábbi, nine miles south-east of Kála Bágh. The following sketch explains its mode of occurrence.



The oil ascends with some water and accumulates in pools till collected by the natives. It is very fluid and of a deep rich red brown, quite devoid of that peculiar green tint of the Rangoon oil. It is chiefly used as an application to mangy camels. The sulphur is found in small lumps and crystals in the limestone not far off. The rock containing it does not effervesce, and resembles gypsum. The pink varieties of the limestone would make handsome marbles; but the natives are unable to dress so hard a stone with the chisel, or rather are ignorant of the process: they cut it, however, with emery and sand into a variety of small articles. A very handsome but soft mottled marble occurs near Sardi; it is of a purplish colour, finely imitative of woody fibre, and is rather I think a bed above the limestone, and one of the tertiary series. Near the petroleum



locality mentioned above, occur some beds subordinate to the limestone, which are worthy of notice. They appear originally to have been a shaly limestone, subsequently subjected to a peculiar action, which has given rise to a number of concretions, causing the whole closely to resemble a conglomerate. These bodies are flattened spheres or ovoids, varying in size from that of a pea to a small apple, the most regular being the size and shape of a flat plum and weathering out of the soft matrix; they are numerous enough in places to hide the ground. They have a conchoidal fracture, and exhibit wavy lines and watering like Egyptian jasper, often but not invariably a nummulite being the nucleus, round which the crystalline particles have ranged themselves; sometimes only a portion of this nucleus remains, the rest having become merged in the substance of the nodule. Their prevailing colour is brown, of various shades of yellow and red. A somewhat similar rock is associated with the mottled limestone before described, near Sardi.

No. 10. Limestone conglomerate.—Above the last described limestone occurs a conglomerate of a somewhat varied character, but continuous throughout the range. At the east end of the range it is a conglomerate of limestone boulders included in a limestone paste. Towards the west this passes into a sandstone containing many small nummulites, and across the Indus it is represented by a coarse grit, with an occasional limestone pebble included. The pebbles vary, but are usually small; some however are several pounds weight. The limestone composing them is subcrystalline, of a yellow or pinkish colour, and has a conchoidal fracture. It does not contain any fossil, but is doubtless referrible to the upper limestone series; and I have a faint idea of having seen a nummulite in it, but such a case is rare. The pebbles are of limestone alone, and of one kind. The limestone-paste abounds in nummulites, which almost constitute the paste in parts, as at Nurpur, where it also contains mammalian bones, but sparingly: it is in fact one of the upper tertiary series, in many of the lower beds of which nummulites occur, shewing a gradual change from one formation to the other.

No. 11. Upper tertiary ossiferous sands and marls.—This series, if not the most interesting, is one of the most extensive in the range. Ten thousand feet is probably not one-half of its actual thickness;

for to the north it stretches like a boundless sea, as far as the weary eye can follow, presenting a seemingly interminable succession of sands and marls alternating with the greatest regularity. The following section will convey an idea of the mode of occurrence of the different beds.

Section near Jábbi, ascending order.

|                                                      |              |
|------------------------------------------------------|--------------|
| Nummulite limestone, . . . . .                       | feet. No. 9. |
| Nummulite sandstone, . . . . .                       | 40 No. 10.   |
| Red and white marls, . . . . .                       | 80 No. 11.   |
| Soft greenish sandstone, . . . . .                   | 90           |
| Coarse band, (marly and concretionary,) . . . . .    | 4            |
| Fine greenish sandstones, . . . . .                  | 180          |
| Green arenaceous marl, . . . . .                     | 15           |
| Greenish sandstone with ferruginous spherules, . . . | 80           |
| Coarse band, . . . . .                               | 3            |
| Greenish sandstones with 4 coarse bands, . . . . .   | 140          |
| Coarse pebbly band, . . . . .                        | 15           |
| Red marl, . . . . .                                  | 15           |
| Green sandstone with coarse yellowish bands, . . . . | 80           |
| Red marl, . . . . .                                  | 10           |
| Coarse pebbly band, . . . . .                        | 40           |
| Red marl, . . . . .                                  | 80           |
| Coarse and fine arenaceous beds, . . . . .           | 70           |
| Red marl, . . . . .                                  | 90           |
| Fine sandstone, . . . . .                            | 60           |
| Red and white banded marls, . . . . .                | 150          |
| Sands, marls and pebbly bands, . . . . .             |              |

The sandstones are usually soft and contain a few pebbles. Their colour is mostly greenish, also white, reddish, or grey. The marls are dull red, or red and white banded. The coarse bands are beds of a concretionary marl, resembling a conglomerate, but rarely containing pebbles. Their colour is mostly yellow, or reddish-yellow and brown. Though fossils are found throughout the series, it is only in a few places that they occur at all numerous. Towards the west of the range, the bones found are little better than mere fragments past recognition; but to the east they are not only more numerous, but well preserved. Near Kulla Kahar east of the salt

lake, bones are pretty numerous ; entire ribs, the pelvis, teeth, and limb-bones, more or less perfect but very friable, or rather shattered : owing to local disturbance of the soft sandstones. The teeth met with are usually well preserved, and their hardness and consequent preservation together with that of the bones would appear to bear an inverse ratio to that of the matrix. A soft sandstone or marl usually affording the finest fossils. In the very hard bands the bones are often soft and friable in the extreme. The fossils are usually completely mineralized, though very many adhere to the tongue, and this character is observed in the weathered surface of many of the best preserved. A narrow ferruginous band between Rhotás and Tilla, of not many inches in thickness, contains many well preserved specimens : among them I may mention a small but very perfect lower molar of an elephant with the jaw attached. The teeth are mostly those of deer and large pachyderms, and the total absence of all carnivorous remains is a striking feature in the deposit. The remains of tortoises are also very common, sometimes an entire case of one being seen. Near Jalálpur a very perfect one was seen fully three feet in length. The teeth of crocodiles are also very numerous in particular bands, usually of a small size but well preserved and beautifully polished. I also procured part of the upper and lower jaws of one of these animals of a small size near Jalálpur. These last remains are usually found in marly beds, the others in sandstone or marl. I also procured some fine specimens from Lehri N. of Rhotás, though I was unfortunately unable personally to visit the locality.

Another and by no means unimportant group of sandstones occurs in many parts of the range, resting unconformably on the last described ossiferous series and the underlying nummulite limestone where denuded. These beds are locally developed, occurring most extensively in the nulla near Jalálpur, about one mile from the village and behind Nowshera, 12 miles east of Mt. Sakesa. The beds in the first locality consist of very soft argillaceous sandstones, thick-bedded and imperfectly stratified, with thick beds of shingly conglomerate almost entirely made up of nummulite limestone boulders. I may here mention that many beds in the ossiferous series (as at Jalálpur) are conglomerates of nummulite limestone



and red sandstone, identical with that overlying the saliferous marl of the range, which proves that great physical changes must have been going on at no great distance, simultaneously with the deposition of the upper beds of the ossiferous tertiaries, to which portion (the upper) they would appear to belong; as also the thick-bedded conglomerates consisting of boulders of all the harder plutonic and metamorphic rocks, which are seen close under Rhotás fort, and resemble nothing more than huge sheets of mortar, the illusion being increased by the crumbling bastions above, of which they at first sight seem the artificial and veritable foundations. These mortar-like beds are nowhere developed in the range save near Rhotás, but are again met with Trans-Indus behind Kála Bágh; and as such an enormous succession of fine sands and marls is met with in the range, it may fairly be conjectured that these "mortar beds" are confined to, and constitute the upper portion of the ossiferous series, of which they undoubtedly form an integral part as seen near Rhotás. The thickness of the unconformable beds near Jalálpur is not very great, but near Nowshera must range to 3 or 400 feet.

At Jalálpur the tertiaries dip  $40^{\circ}$  to  $50^{\circ}$  to the south gradually, becoming vertical on ascending the nulla; the dip then wavers somewhat, though always high, and then gradually declines  $40^{\circ}$  to  $20^{\circ}$  north. The upper beds near Jalálpur are conglomerates, then come (descending) red and yellow marls banded with greenish sandstones, then sandstones with some bands of marl, and the lowest beds are a vast number of fine sandstones and pebbly grits, with but little marl. The whole evidently being very high in the series: and this is curious in one respect, as where the beds are vertical, a portion of the true saliferous gypseous marl of the range has become intercalated, simulating an actual bed in the tertiaries. A bed of red sandstone occurs above it, but whether it has also been intercalated, or is a mere accidental variety of a tertiary sandstone, is not easy to decide; since the lower rocks are in close proximity to the tertiaries on either side, and the faulting and disturbance in this part has been very extensive and complicated. In this case a cursory examination would lead to the idea of an actual saliferous marl occurring in the tertiaries, especially as many marls of that series bear a very strong resemblance to the true salt marl; but it is to be



doubted if any tertiary bed is *per se* saliferous, in the ordinary meaning of the term. It is true, many of them become much impregnated with salt, owing to the vicinity of rock salt in the true salt-marl, even where this rock may not be actually exposed; but throughout the vast series of marls exposed in the range, no instance occurs of their yielding a brine which is not plainly derived from the salt marl and rock salt. The tertiary marls yielding brine, as mentioned by Major Vicary and others, must in all probability be so circumstanced; being evidently the same ossiferous series that occurs in the Range, the brine being derived from some deep-seated bed of rock-salt or marl corresponding to the salt-marl of the Range.

The last deposit to be noticed in connection with the range is one of the most recent date. It consists of a confused and mostly unstratified accumulation of debris, forming a fringing talus along the entire south base of the range, not shelving gradually to the plains, but terminating somewhat abruptly in a number of bluffs some 40 feet or so in height, separated at irregular intervals by creeks or inlets, and the whole having evidently once formed a submarine bank, originated in the action of the waves on the crumbling coast-line of the range. It is widest at Pind Dadun Khán, where it is fully three miles broad; one mile, however, may be taken as rather above the average breadth. It consists entirely of debris from the range, and under the hills receives yearly additions by the masses brought down by rain from the hills. From its porosity and dryness, the jungle growing on it is thin and stunted: it forms, however, a valuable grazing tract for camels and other beasts belonging to villagers in the plains.

Having described the stratified rocks of the Range, I may here briefly notice some rocks, which (though not connected with it) are, from their position, not without interest. I allude to the small cluster of hills between the Jhilum and Chináb rivers, called the Karána hills, the most prominent peak of which is 24 miles south south-east (S. S. E.) from the station of Sháhpur, and a little over 40 miles in a direct line from the nearest point in the Salt Range. These hills rise somewhat abruptly from the plains in detached ridges or clumps, the highest scarcely attaining 600 feet. They are composed of a species of slate, the slaty structure being but feebly

developed, and the original planes of stratification with deep ripple markings in places well preserved. The prevailing colour of the slate is gray, stained red and yellowish, and weathering to a dark burnished brown, in which state it presents an intensely ferruginous and burnt aspect, relieved by occasional veins of pure white quartz. These veins occur with no regularity and are rarely of any thickness. Much peroxide of iron is associated with these rocks, and a curious carbonate of lime and iron (vide Mr. Piddington's examination of the ore, J. A. S. Vol. XXII. p. 208), resembling a rich carbonate of iron, but, in reality, rather a carbonate of lime, occurs associated with the quartz veins. One of the largest veins observed was about one foot in thickness, half consisting of pure white quartz, the rest of the curious carbonate of lime and iron examined by Mr. Piddington.

I now come to the consideration of rocks of an igneous character, which, it has been asserted, occur nowhere throughout the Salt Range. Trap however undoubtedly occurs at some few places towards the east end of the range, and in other places signs of a metamorphic action having been exerted on the rocks are pretty plain. On the southern descent of Mt. Tilla, the upper strata are seen much shattered and re-cemented by stalactitic infiltrations, and many beds of shale appear greatly altered and strongly impregnated with iron. This very circumstance may be perhaps rather the cause than the effect, for I need only quote "laterite" as an instance of what singularly deceptive and protean aspects, a rock containing much iron is capable of putting on. The Karána rocks also afford striking instances of that pseudo-slaggy appearance that some ferruginous rocks exhibit, so that perhaps these appearances on Mt. Tilla cannot safely be referred to metamorphic action properly so called. An instance again occurs in the Nilawán ravine below Nurpur, where two beds of sandstone are seen much altered and thrown up at 20° N. N. W., crossing the gorge something in the manner of a low wall. Between them a ferruginous trap rock occurs, which alters and hardens the adjoining rocks to a depth of eighteen inches, and is thus the cause of their standing up like a blackened wall from among the soft unaltered strata. Near Mári also many beds of sandstone appear altered by hot vapours traversing the planes of stratification though to no great extent, the action scarcely affecting more than

the surface. This appearance however should not be confounded with a somewhat similar one also seen in the same beds, and produced by the decomposition of pyrites in the sandstone itself.

I shall now describe an actual trap, which, though far from common, is interesting as a *bonâ fide* representative of its class. This trap occurs only at the east end of the range and is confined to the red salt-marl, and appears in connection with one of the best marked faults in the range (*vide* Choa valley section). It occurs in four places, *viz.*: 1st, On the east side of the Kiura gorge about half a mile above the village. 2nd, On the west shoulder of Mt. Karingli, in a nullâ opposite the small village of Chumbi. 3rd, On the N. W. side of the Makraj gorge, above the waterfall. 4th, In the Nilawân ravine below Nurpur, a short distance from the salt choki; and at a few other spots. The colour of this trap is a dull brownish or reddish purple. It is trachytic, and tolerably compact and hard, and is traversed in every direction by short capillary markings (probably, very minute crystals of tremolite), which in perfectly unweathered specimens are occasionally obsolete.

Although from the nature of that rock, its junction with the red marl is never well seen, yet its action on it is sufficiently well marked. It converts the bright red marl into an orange or cream coloured mass, very vesicular at the immediate point of contact, and containing kernels (as at Nurpur) of a greasy earth, like soap-stone, at other places (Kiura) kernels of a glassy zeolite and geodes with crystals of a similar mineral. The vesicles in the marl are usually coated with an impalpable black, red, or yellow powder.

The trap itself changes somewhat in character in contact with the marl, becoming amygdaloidal and otherwise assimilating to that rock. When decomposed, creamy yellow spots become developed in the trap, which gradually enlarge, till the mass becomes converted into a yellowish-white bole, or hard earth traversed in every direction by radiating spiculæ (tremolite?) which seem to exist in a latent form till rendered visible by decomposition.

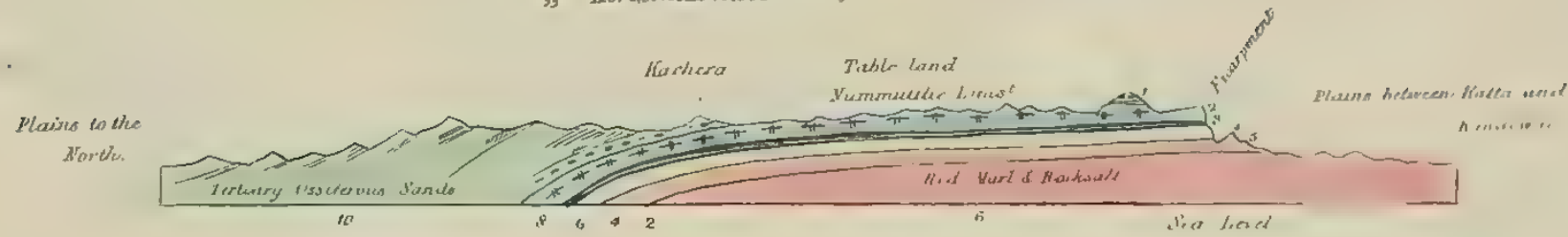
The gypsum in the vicinity of the trap is rendered coarsely granular and somewhat incoherent. So conclusive is this appearance that it was one of the arguments on which Dr. Fleming based his theory\* of the ERUPTIVE origin of the RED MARL itself, gypseous

\* *Vide* Quarterly Journal Geographical Society, for August, 1853.

# Section across the Range through Kachera.

Scale Vertical 5000 = 1 Inch.

Horizontal 10,000 = 1 In.



Pale Casmune.

" Indian Red.

" Indian Ink.

" Gamboge.

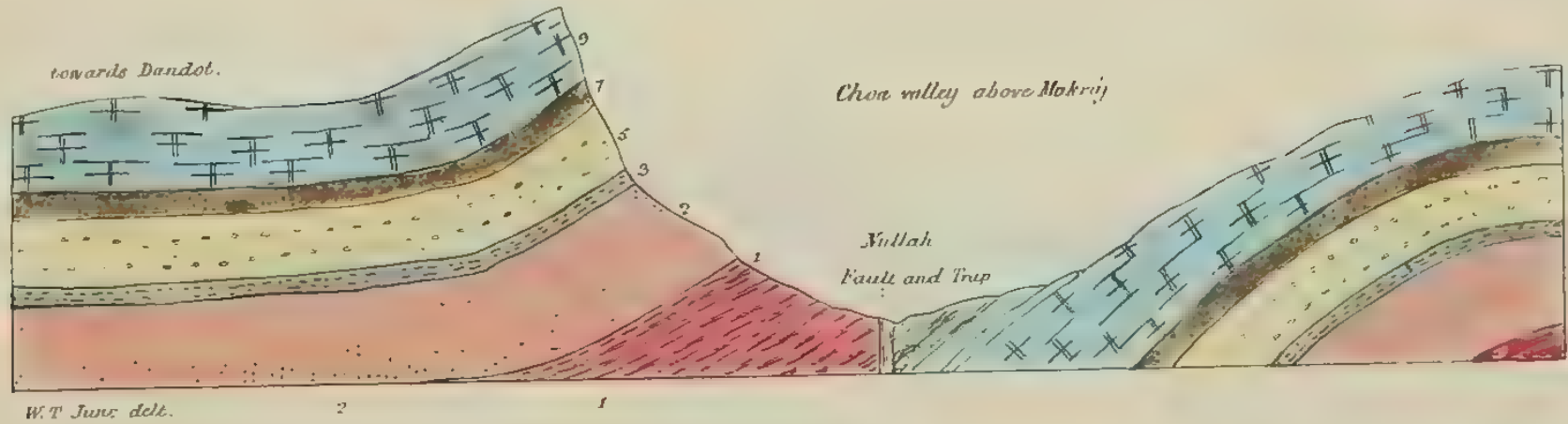
" Neutral Tint

" Orange.

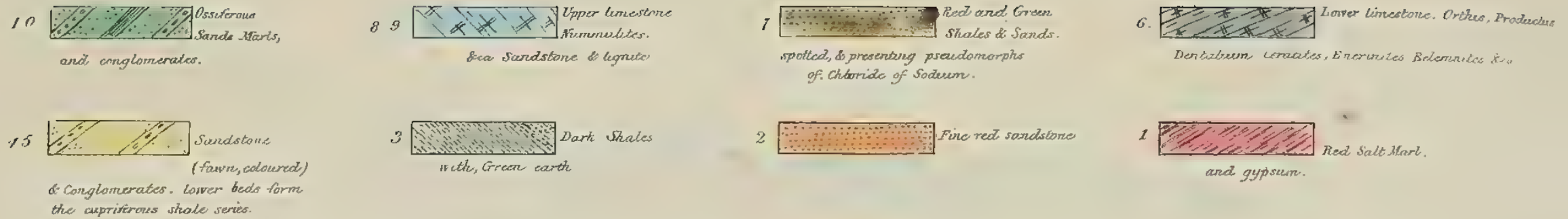
" Cobalt.

" Green Ferulifer.

1 Perianthus  
2 L. Nummularia  
3 L. Productus  
4 Sandstone  
5 Red Sandstone  
6 Red Marl



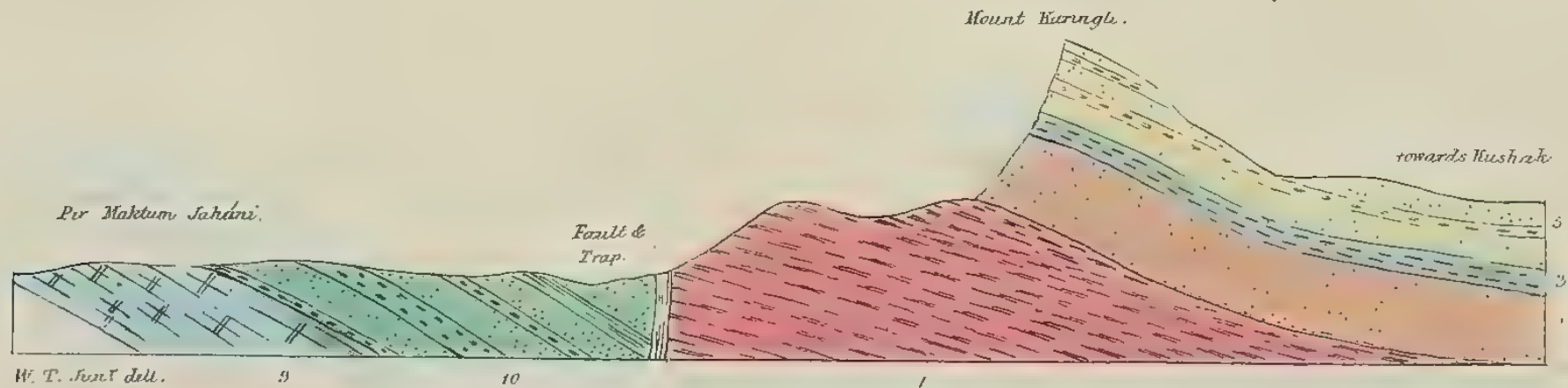




Scale of Sections. 1000 feet = 1 Inch.

Datum line 900 feet above Sea.

(A B and C)



as that rock is throughout its length and breadth; the trap, the obvious cause of the local change in the gypsum, being regarded by Dr. Fleming as an "*altered sandstone or clay.*"

This is the trap, fragments of which are previously described as occurring in the marl. I have only observed them at Kiura, in the ravine between Mr. Wright's house and the Sujwála mine, and in a breccia of red marl and gypsum near the same place, seemingly produced by the intrusion of the main body of trap in the Kiura gorge.

P. S.—For the following notes I am indebted to the kindness of Dr. Falconer, who took the trouble to examine a small collection of fossils from near Jalalpur and Lehri, the result of which, as here given, being of considerable interest, and going far to establish the identity of the Trans-Indus tertiaries and those of the Salt Range with the far-famed Sewalik beds. Two points are especially curious; the perfectness of single teeth and small bones, and the usually sharp fracture of the larger bones, together with their rather *local* abundance; and the total absence or great scarcity of the remains of carnivorous animals.

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*"Notes of some fossils from near Lehri and Jalalpur—Salt Range, Punjab.*

The fossils are for the most part small fragments; the edges are generally sharp, and the most of them are in the ordinary mineral condition of Sewalik-Hill specimens, occurring in a sandstone matrix and impregnated with lime. Some of them adhere to the tongue, besides ivory tusks.

Many of the specimens are, from their fragmentary condition, indeterminable. The following is a rough list of what could readily be made out.

PACHYDERMATA.

PROBOSCIDA.

*Elephas*.—A plate of a worn molar; species indeterminable, but probably *E. Hysudricus*.

*Mastodon*.—2 specimens of molar ridges of the Elaphantoid or *Stegodon* group; species indeterminable.

2 fragments of ivory tusks.

*Hippopotamidæ*.—Tusks of the lower jaw of a larger size than are usually met with in the Sewalik Hexaprotodon, and resembling more the true Hippopotamus or *Tetraprotodon* of the Nerbudda.

*Rhinoceros*.—Upper and lower molars in fragments.

*Equus*.—Upper and lower molars of 2 species.

*Sus*.—Upper jaw.

#### RUMINANTIA.

*Sivatherium*.—Lower jaw (fragment) with tooth.

*Bos*.—Upper and lower molars and fragments of jaws.

*Cervus and Antelope*.—Several species, some of them very minute. Abundance of Astralagi, femur ends, and scapula cups, also fragments of deer horns.

*Camelus*.—Portion of a molar.

#### AVES.

Fragment of a leg bone with the articular surface, of a large form belonging to the Grallæ.

#### REPTILIA.

*Crocodilus and Leptorhynchus (Gavialis)*.—Lower jaws and teeth with vertebræ.

*Trionyx*.—Fragment of the carapace with vertebræ of a large species.

*Fish*.—A vertebra.

#### MOLLUSCA.

A few lime casts of one of the species found in the Sewalik Hills.

There are in the collection a number of indeterminable fragments of other bones.

The characters of the collection are entirely those of the Sewalik Hills Fauna as usually met with; with the single exception of the Hippopotamus tusk.

There was in the collection one piece of Endogenous fossil wood resembling the Irrawaddy specimens, found so abundantly near and above Prome.

H. F.

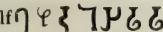
Calcutta, 12th September, 1854.



*Coins of Indian Buddhist Satraps, with Greek inscriptions.—By  
Major A. CUNNINGHAM, Bengal Engineers.*

Of the numerous coins bearing Greek legends which, during the last twenty years, have been found in Cabul and the Punjab, the greater number belong to the series of pure Greek princes, who ruled over the Indian provinces of Alexander the Great. The remainder belong to their Seythian conquerors; to Hyrkodes and Kadaphes; to Moas and Azas; to Barano, Hoerke and Kanerki; and to their Indo-Parthian contemporaries, to Vonones and his brother Spalhores, and to Gondophares, his brother Orthagnes,\* and his nephew Abdagases.

Amongst all these coins, certainly not less than thirty thousand in number, and which range over a period of more than three centuries, not a single specimen has hitherto been found bearing a pure Hindu name in Greek characters. And yet in the Punjab at least we might have expected to have found some remains of a partially Hellenized currency of the descendants of Taxiles and Porus. Of the great competitor of Alexander, we only know that he was a descendant of Gegasios,† or *Jajáti*, which proves that he was of the

\* The coins of this chief are extremely rare. His name occurs only in the Greek legend as OPΘAΓNHΘ, or OPΘAΓN; but in the Pali legend he styles himself . *Gondophara Sagaba*, “the full brother of Gondophares.” *Sagabha* is the Pali form of the Sanskrit सगर्भ्य, *Sagarbhya* “of the same womb,” which is now represented by the Hindi *Saga-bhai*. Abdagases calls himself the *bhāta-putra*, or brother’s son” of Gondophares. The coins of Vonones always present the name of his brother on the reverse—thus: *Maharaja-bhrata dhamiasa Spalahorasa*, “(Coin) of the king’s brother, the just Spalhores.”

† This fact is preserved by Plutarch, de Fluviiis, in voce Hydaspes. When Porus was assembling his troops to oppose Alexander, the royal elephant rushed up a hill sacred to the sun (the present *Bálnáth-ki-Tila* or “hill of the sun god),” and in human accents exclaimed “O great king, who art descended from Gégasios, forbear all opposition to Alexander, for Gégasios himself was also of the race of Jove.” The hill was afterwards called “the hill of the elephant,” which I take to be another proof of its identity with Bálnáth; for this name is in most of our maps written *Bilnaut*, and is commonly pronounced *Bilnáth* or *Belnáth*, which I suppose the Macedonians, who had just come through Persia, to have mistaken for *Fil-náth* or *Pil-náth*—the elephant. See Hodgson, *Geography*, Vet. Vol. II.



lunar race of Hindu princes, and strengthens to a certainty the belief that has generally prevailed amongst Sanskrit scholars, that Porus was not the individual name of the king, but that of his race, as a *Paurava* or descendant of *Puru*. In the spoken language the patronymic is pronounced *Paurav* and *Pauru*, which with the Greeks, became Πῶρος.

The great Porus himself was treacherously murdered by the Greek governor of the Punjab after the death of Alexander, but nothing is recorded of his descendants or of those of his cousin, the second Porus. We know only that as the whole of the Punjab was subjected by Chandra Gupta Maurya, the royal Pauravas must of course have become his tributaries. Some orientalists still affect to doubt the identity of Chandra Gupta and Sandrakoptos, which, though at first only a happy guess of Sir William Jones, was afterwards all but actually proved by the researches of Professor Wilson, who showed that the same private scandal was related of Sandrakoptos by the Greeks, as of Chandra Gupta by the Hindus. I will now add my mite towards settling this important point which is the very corner stone of ancient Indian chronology. Euphorion,\* who became the librarian of Antiochus the Great in 221 B. C. states that the

Μωριῆς, ἔθνος ἰνδικόν, ἐν ξυλίνοις οἰκούντες οἴκοις

“the Indian *Morias* live in wooden houses;” to which Hesychius adds

Μωριῆς, οἱ τῶν ἰνδῶν βασιλεῖς.

These *royal Morias*, who dwelt in wooden houses, must therefore be the same regal *Mauryas*, who lived in the wooden palaces of Pataliputra or Palibothra.†

During the reigns of Chandra Gupta and of his successors Bimbisara and the great Asoka the province of Taxila was only a dependency of the vast Indian empire of the Mauryas, the governorship being generally held by one of the king's sons. But after the

\* Stephanus Byzantinus, in v. Μωριῆς.

† Nearchus, in Arrian's *Indica* c. x. says that the Indian cities that were situated on rivers, were built of wood. The bas-reliefs of the Sanchi tope, which were sculptured in the reign of Satakarni, about A. D. 20, represent palaces of wood with the rafters in perspective.

decline of the Mauryan dynasty, and during the decay of the petty Greek kingdoms of Cabul and the Panjab, it might have been expected that some scion of the royal house of Puru, some second Porus, would have asserted his independence; or that some more daring native adventurer; some ancient Ranjit Singh, would have carved out a kingdom for himself. Some traces of such events may perhaps be seen in the frequent changes of the Indian dynasties of Delhi and Magadha just before the Christian era, as recorded in the *Rájavali* and in the *Puránas*.\* This re-assertion of native power and influence may also, I think, be seen in the coins of the accompanying plate, which bear the unmistakeable Hindu names of *Mahigula*, *Jivanisa*, and *Rájabála*.

The corrupt style of the Greek letters and the types, which are imitated from those of Azas and of the later Greek kings, show that these satrap coins must belong to the first century before the Christian era. Now at this very time, the throne of Delhi was occupied by the *Mayúra* family, said to be of lunar descent, amongst whom, there occur three princes, whose names differ so little from those of our coins as almost to warrant the conclusion that they are the same. This conclusion is, I think, much strengthened by the prevailing mint mark on the coins of *Rájabála*. It consists of two Pali letters,  $\Gamma$  |  $\Sigma$ , forming the word *Hasti* which I take to be the numismatic contraction for *Hastinapura* on the Ganges, the celebrated ancient capital of the lunar race. It is true that these letters might also stand for *Hastinagara*, the city of Astes, prince of Peukelaotis and the Hashtnagar of the present day. But this is not borne out by the places where the coins have been discovered. Of *Zeíónisos*, or *Jivanisa*, only four coins have yet been found, all of which were procured in the Punjab. My two specimens came from Kashmir and Ráwal Pindi. Of *Rájabála* not a single specimen, to my knowledge, has been found to the west of the Chenáb. My own coins were obtained at Amritsur, Lahore, Harapa, Shorkot Tulamba, Kahrór, and Multan, all in the Eastern Punjab; and at Delhi and Mathura on the Jumna. The greatest number were procured at the last place, and were said to have been found in the ruins of the city, along with some rude hemidrachmas of Strato.

\* See Prinsep's Useful Tables—pp. 98—100.

We have thus the additional evidence of time and place in favour of the identification of these Hindu satraps with their namesakes of the last lunar dynasty of Delhi.

This dynasty is of some importance in Indian history, as the last prince, *Rājapāla*, was vanquished by *Sākāditya*, or Sakwanti, the chief of the Sākas, or Indo-Scythians, who was himself overcome by the celebrated Vikramaditya, in the year 56 $\frac{3}{4}$  B. C. On this victory, the conqueror assumed the title of *Sākāri* or "foe of the Sakas," and from it, the Hindus have dated one of their principal eras, the Vikramaditya Sambat, which is still in use.

The names of the princes of the Mayura dynasty of Delhi are given by Tod\* from the Rājāvali, by James Prinsep† from Tod, and by Ward‡ from the brāhmins of Bengal. As these lists differ from each other, and from a third in my own possession, which was obtained from a learned purohit in the Punjab, I think it is highly probable that all three are more or less faulty in the spelling of the names, of which the true orthography may have been preserved by the coins. In Prinsep's list, which is copied from Tod, the name of the founder of the dynasty has been omitted by mistake; and the two names immediately preceding his last are formed by the division of the penultimate name of our lists, and our fourth name is omitted altogether, probably owing to its similarity with the preceding one. But there is still so close an agreement in the names of the three lists, as to warrant our confidence in their general accuracy. I now give the different lists with the probable date of the accession of each prince.

#### MAYURA DYNASTY OF DELHI.

|           | <i>Ward.</i> | <i>Tod, Prinsep.</i> | <i>Cunningham.</i> |
|-----------|--------------|----------------------|--------------------|
| B. C. 230 | Dhurandhara  | Dhudsen              | Yonadhara.         |
| 210       | Senodhata    | Senadhwaja           | Senadhwaja.        |
| 190       | Mahākataka   | Mahaganga            | Mahiganga.         |
| 170       | Mahayodha    | (Caret)              | Mahajodh.          |
| 150       | Nātha        | Nāda                 | Sarma.             |
| 130       | Jivana-rāja  | Jewana               | Jivan-sirāj.       |

\* Tod's Rājasthan, vol. I. Table II. and page 51.

† Useful Tables, p. 98.

‡ Ward's Hindus, 8vo., vol. I. p. 24.



|     |                                       |                      |             |
|-----|---------------------------------------|----------------------|-------------|
| 110 | Udaya-Sena                            | Udiya                | Umed-sen.   |
| 90  | Vindhachala                           | { Jehala<br>Ananda } | Anandajala. |
| 70  | Rájapála                              | Rájapála             | Rájapála.   |
| 60  | Delhi taken by Sákáditya or Sakwanti. |                      |             |
| 57  | Ditto retaken by Vikramaditya Sákári. |                      |             |

Several of the facts regarding this dynasty, which are recorded in the Rájávali, are also mentioned by Ferishta, but the names are much changed and misplaced. The general agreement of the incidents however, is curious, as Ferishta wrote his history in the south of India just one hundred years before the compilation of the Rájávali by the order of Siwai Jay Singh of Amber. But the Mahomedan historian has a still more striking coincidence with a statement of Polybius, which has been already noticed by James Prinsep,\* who supposed that Ferishta's information was derived "not from the Greeks, but from native authorities now no longer extant." These two statements, which refer to the same period of history, are so exactly alike, and so precise in their language, as to leave no doubt in my mind that they refer to the same person, although the names are different. I will now place the two passages side by side in translations given by authors who were not aware of the coincidence.

*Polybius.*

"Passing Mount Caucasus he (Antiochus) came into India and renewed his alliance with Sophagasenus, the Indian prince. In this place he obtained more elephants so that his whole number was now a hundred and fifty."—

*Hampton.*†

*Ferishta.*

"He (Jona) was contemporary with Ardshir Babegán, who invaded India; but being met by Jona with valuable presents of gold and elephants on the frontier, Ardshir was induced to withdraw his army."—*Briggs.*‡

In both of these passages, we have the same story of the invasion

\* See Journ. As. Soc. Bengal, 1838, p. 163.

† Hampton's Polybius, 510.—See I, XI. page 8.—"ὑπερβαλὼν δὲ τὸν καύκασον, καὶ κατὰρας εἰς τὴν Ἰνδικὴν, τὴν τοῦ φιλίου ἀνενεώσατο τὴν πρὸς Σοφαγασήνων τὸν βασιλεία των Ἰνδῶν, καὶ λαβὼν ἐλέφαντας, ὥστε γενέσθαι τοὺς ἅπαντας εἰς ἑκατὸν καὶ πεντήκοντα.

‡ Brigg's Ferishta, vol. I. p. lxxiv.



of India by the king of Persia, and of the invader's retirement on receiving a number of elephants from the king of India.\* The period at which these invasions took place is also the same, as I will now show. The Greek historian is relating the Indian expedition of Antiochus the Great, which Bayer and others have agreed to fix in B. C. 205. On this occasion, he renewed his alliance with the Indian king. At what time, his original alliance took place is not mentioned, but we may fix it with great probability in B. C. 220, at the close of his first eastern expedition. From 220 to 212 B. C. Antiochus was fully employed in his wars with Ptolemy, and his second eastern expedition lasted from 212 to 205 B. C. The reign of the Indian king may therefore be supposed to have commenced at least as early as that of Antiochus himself, or in B. C. 224.

The Mahomedan historian calls the king of Persia, Ardshir Babegán, which is an evident mistake, as this is the well known name of the founder of the Sassanian dynasty in 226 A. D. I would read Artabán, for Arsaces, 3rd Artabanus, who reigned from B. C. 216 to 196, and was therefore a contemporary of Antiochus the Great, and his Indian ally Sophagasenus. In favour of the correctness of this alteration, we have Ferishta's previous mention of *Gudarz* and *Tirasi*† as the kings of Persia to whom Jona's predecessors had paid tribute. The latter name I would correct to پرسی *Pirasi*, and thus identify the two kings with Gotarzes and Volageses 1st.‡ It is true that the dates of these two princes are much too late for the period of Jona: but it must be remembered that Ferishta had access only to the Persian historians, according to whom *Gudarz* and *Volas* are the fourth and fifth princes of the Ashkanian dynasty. There is an acknowledged confusion in these Persian accounts between Ashkanians and Ashganians; but *Gudarz* and his son *Volas*, the fourth and fifth princes of the former dynasty, are evidently those to whom Ferishta alludes. The Greek and Roman

\* In the original of Ferishta, I find the word "jewels" added to the other gifts which General Briggs has omitted in his translation; وزر و جواهر بسیار و فیالان "gold and many jewels and elephants."

† کون رزو ترسی — *Gudarz wa Tirasi*.

‡ *Tirasi* may however, as Jas. Prinsep suggested, be only a Persian form of Tiridates.

historians also differ amongst themselves; but the commonly received account related that Arsaces, the founder, was succeeded by his brother Tiridates, who was succeeded by his son Artabanus. By omitting the second Ashk of the Persians, who is not mentioned by the western authors, the two accounts will correspond exactly as to relationship, although not in names. Gudarz and his son Pirasi will thus become the third and fourth princes of the dynasty, and be identified with Artabanus and his son Priapatius, who together occupied the Parthian throne from B. C. 216 to 190.

Regarding the date of Jona we have in all the copies of Ferishta the uniform term of seventy years assigned to Sansárchand alone, or to himself and family. If we place the accession of Sansárchand or Sandrakottos in B. C. 312, we shall obtain B. C. 242 for the accession of the Jona Rája of Ferishta; and as he is said to have reigned ninety years from B. C. 242 to 152, he was a contemporary of Antiochus the Great, during the whole period of his reign.

On referring to my list of the Mayúra dynasty of Delhi, it will be seen that the founder is named *Yavana-dhara* or rather *Yona-dhara*, یوندر, which is the same name as *Yona* or *Jona*. The date which I have assigned to him from B. C. 230 to 210 is not an arbitrary one, but is based upon the interval elapsed between the great war and the victory of Vikramaditya. In Tod's and Ward's lists, the number of princes from Parikshita the son of Arjuna to Rajapala is sixty-six: in my list, the number is sixty-eight. Now allowing an average of twenty years to each reign, the accession of Parikhshita will be placed in 1397 B. C., a date which agrees exactly with the close of the great war.\*

Regarding the various names of the founder of this dynasty we may rest satisfied with the explanation given us by Strabo, that it was customary for the princes of this period to have two or three

\* Colebrooke and Davis, 1391 B. C. from observations of the equinoctial colures recorded by Parásara—Wilford, 1367 B. C. from independent observations—Wilson, 1430 B. C. The mean of these is 1395 B. C. The date of 1180 B. C., which Jas. Prinsep was inclined to adopt on account of its near coincidence with B. C. 1176, the epoch of Paras-sur-áma whose era is still in use, was the *first* calculation of Davis and Colebrooke. Their *corrected* calculation was the earlier date which I have given.

names. Thus Chandra-Gupta had a birth name, which is not mentioned; a local name, *Palibothres*, or lord of *Palibothra*, and a royal name, *Sandrakottos*, which he assumed on his accession to the throne.\*

The Greek name of Σοφάγαστρος is most probably the Sanskrit साभागसेन, *Saubhāgasena*, or chief of the fortunate army, that is, the victorious leader. *Yavanadhara* means the "keeper of Greeks," or the retainer of Greek troops; and *Durandhara* means the "possessor of good qualities" or the "possessor of wealth." Both of these are royal titles which may be compared with those of the Arsacidæ of the same period, Philhellenos and Evergetes. *Saubhāgasena* and *Yavanadhara* may be considered as varieties of the same title as the leader of a body of Greeks would of course have been the chief of a fortunate or victorious army. The name of *Dhudsén*, which is given by Tod, appears to me to be the common colloquial corruption of *Dhursén*, the chief of a good army, which may also be considered as synonymous with *Saubhāgasena*.

Now it is curious that all these names refer to the military character of the chief, which is also ascribed to the founder of the *Mayūra* dynasty in the Rājāvali. Ward calls him simply the minister, but both Tod's list and mine more correctly state him to have been the "military minister" of his predecessor. Ferishta mentions that he was the nephew, خواهر زاده, *Khawāhūr-zāda*, the "sister's son" of *Fūr*, the antagonist of Alexander: but I suspect that he may have mistaken the family name of مور *mūr* (Mora, Maurya or Mayura) for فور *Fūr*. This seems to be the more probable as my list mentions that the throne which he obtained had formerly belonged to his ancestors. It is possible therefore, that *Durandhara*, the "possessor of wealth," or of "good qualities," may be the same as the prince *Sampadi* the "increase of wealth," or of good qualities, who was the son of Kunāla, and the grandson of Asoka Maurya.†

There is one other fact about *Jona* which must not be omitted. According to Ferishta, he is said to have been a liberal prince, who

\* Megasthenes in Strabon, XV. Similarly we have Omphis and Taxiles; the former being most likely the real name, the latter certainly the local one, as lord of Taxila.

† Burnouf-Bluddhisme Indien, p. 430.



patronised the arts and founded many cities on the Ganges and Jumna.

Of his immediate successors, *Senadhwaja* and *Maháganga*, I have nothing to say; but the fourth prince *Maháyodha* or *Mahi-jodh*, whose name is unfortunately missing in Tod's list, is most probably the same as the *Mahigul* of the coins. The sixth prince *Jivana*, or *Jivansiráj*, is, I have little doubt, the *Jivanisa*, or *Ζεωνισος*, of the coins; and the last prince *Rájapála* is, I think almost certainly, the same as the *Rája-bála*, or *Ραζιο βαλος* of the coins. In Ward's account it is stated that *Rája-pála* having given himself up "to effeminate amusements, his country was invaded by *Sákáditya* king of Kumaon who proved victorious and ascended the throne."\* In my list it is added that *Sákáditya* was invited by *Rájapála's* minister. Tod has made a jumble of this simple statement by confounding *Sákáditya* the "chief of the Sákas," with *Vikramáditya*, the *Sákári* or "foe of the Sákas."

In all these accounts the successful conqueror of Delhi is called lord of the mountains of Kumaon. Even in Ferishta we find *Fúr*, the antagonist of Alexander, styled "king of Kumaon." The Sanskrit name is *Kúrmmávan*, or *Kúrmmáchal*, which is a synonyme of *Himáchal*; but as *Kúrmma* is the same as *Kachchhapa*, कच्छप, a tortoise, we may identify *Kúrmmachál* with *Kachchhwáchal*, and the kingdom of Kumaon with that of *Khache* or Kashmir which in the time of the Indo-Scythians, or Sákas certainly comprised all the mountains of the Panjab then inhabited by *Khasas*. In proof of this, I need only mention that the Mongol author Sanangsetsen calls Kanishka the king of Gache; and that in an inscription, still existing in the Indreswari temple at Kangra, mention is made of the *Gachchhé-ráj* or kingdom of Gaché.† These facts are, I think, sufficient to prove that *Sákáditya* was not the petty chief of the Kumaon hills, but the great king of the Indo-Scythians as his

\* Ward's Hindus, I. 24.

† It is possible however, that *Gache* or *Gachu* was only the name of Kanishka's original kingdom of *Kie-chi* between Balkh and Bamian. The name is still preserved in *Ghaznigak* (the *Ghaznik* of Taimur) near the old fort and caves of Semengán, or Haibak as it is now called. The great Scythian may still have retained the title of king of *Gache* after all his conquests.



name imports, and whom we know to have been in possession of the Panjab at this very period.

I will now describe the coins and inscriptions which I have collected together in the accompanying Plate. They are of the highest interest and value for the elucidation of Indian history just before the Christian era; as they afford a sure guide to the religious and political state of India at that particular period.

*Coins of JIVANISA.*

*Fig. 1*—Round silver didrachma, unique. Jas. Prinsep. Journal As. Soc. vol. V. Pl. XXXV., fig. 5. R. Rochette. Journal des Savants 1839, p. 102—Prof. Wilson, Ariana Antiqua Pl. VIII. fig. 17—p. 312.

*Obverse.* The king on horseback. In front the Buddhist Monogram of Dharma. Greek legend, only partially legible.

*Reverse.* The king, clad in the Indian *dhoti*, standing to the front. On each side of the king is a Victory engaged in crowning him with her right hand. Ariano Pali legend incomplete: *Mahigu (la Cha) trapasa Jivonisasa*. This coin, which was in General Court's collection was assigned doubtfully to Mauag by R. Rochette, who thought that he could trace the words ΜΕΤΑΛΟΥ ΜΑΥΟΥ: but he admitted that the correctness of this reading would depend on the decipherment of the native legend. From Jas. Prinsep's etching, which was copied from General Court's sketch, I was inclined to assign this coin to Artemidorus, of whom I obtained a coin in 1848. But its true attribution has been finally settled by the following coin which bears exactly the same legends in a much more perfect state.

*Fig. 2.* Round silver Hemidrachma, unique. E. C. Bailey, Esq. Panjab, 35 grains.

*Obverse.* The Raja on horseback: the Buddhist monogram of Dharma in front. Greek legend in corrupt characters.

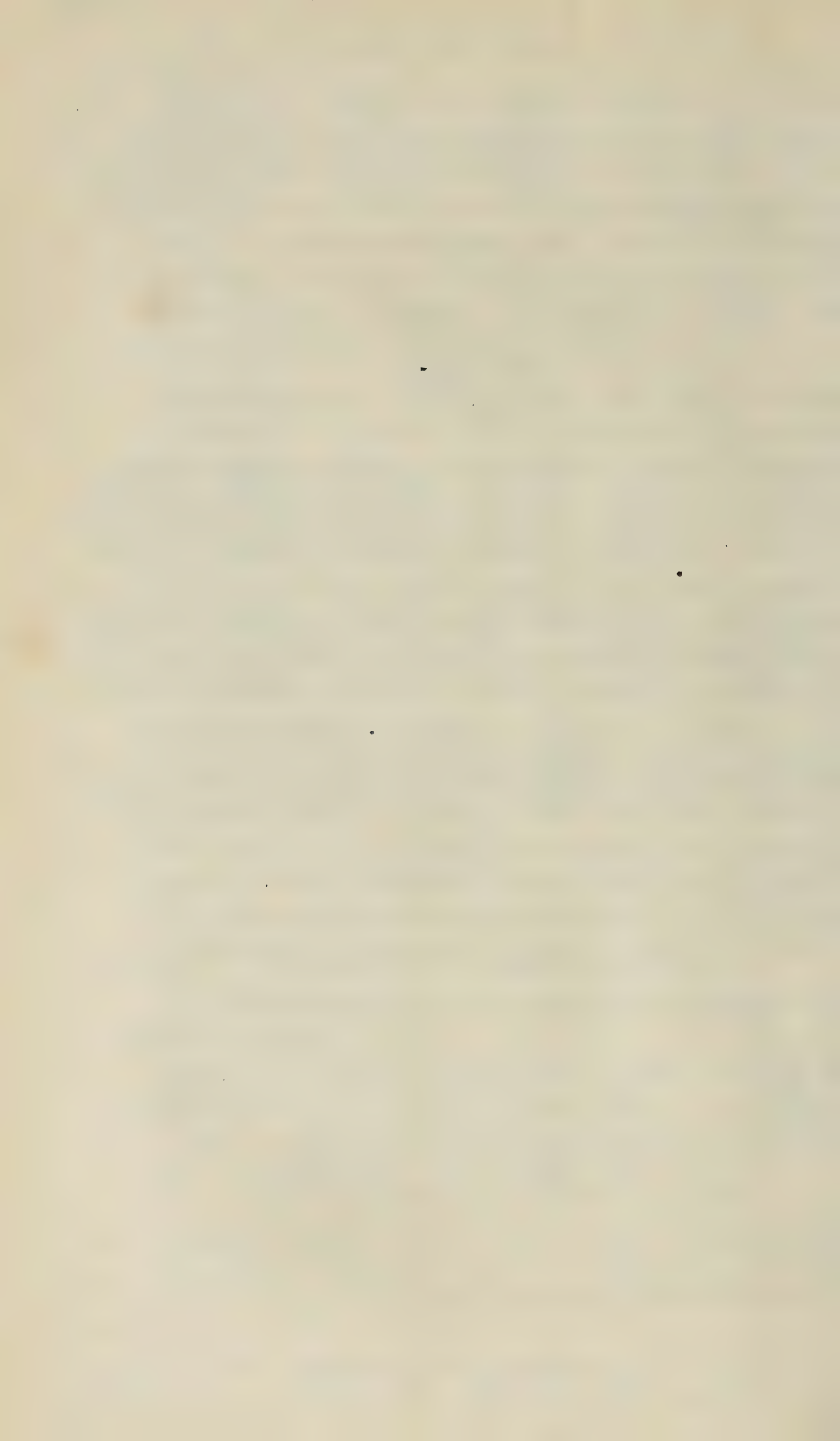
ΟΝΝΗΛΑΙΥ ΥΗΥΖΑΤΡΑΠΗ. Ζ Ε ΙΩΝΙCΟΥ

or, ΟΤΤΥΛΟΥ ΥΙΟΥ ΣΑΤΡΑΠΗ ον ΖΕΙΩΝΙΣΟΥ.

(Coin) of Mahigul's son, the Satrap Zeiónisos.\*

\* I consider this name to be the same as the Greek Διονυσος, as both terms are simple renderings of *Jivanisa*, the "lord of life." In India this was a title of the procreative Mahadeva. In this form of the reproducer, the youthful Ιακχος was





*Reverse.* Demeter, or the Indian *Ardokhro*, with a cornucopia in her left hand, and a wreath in her right, with which she is crowning the Rāja who is standing before her. Ariano-Pali legend "*Mahigulasa Chatrapasa-putrasa Chatrapasa Jivanisa*" (coin) of the Satrap MAHIGUL's son, the Satrap JIVANISA.

*Fig. 3.* Round copper coin weighing 167 grains, procured at Kashmir.

*Fig. 4.* Ditto round copper coin similar to the last, procured at Rawal Pindi.

Both of these coins are in my own possession; and I am not aware of the existence of any other specimens. No. 4 has the name perfect which is wanting on No. 3.

*Obverse.* Humped Indian Bull: Buddhist monogram of Dharma; corrupted Greek legend as on Nos. 1 and 2.

*Reverse.* The *Singha*, or maneless Indian lion. Ariano-Pali legend as on Nos. 1 and 2.

The types of the horseman on the silver coins, and of the bull and lion on the copper coins, all show that *Jivanisa* cannot be dated earlier than the reign of Azas, from whose coins they are evidently copied. Prof. Lassen assigns the reign of Azas to B. C. 116-90 and my own chronology to B. C. 110-90, both of which periods correspond with the approximate date of *Jivana* given with my table a few pages back. The prominence of the monogram of Dharma on all his coins proves that Jivana was a Buddhist and his imitation of the types of Azas indicates that he was most probably the satrap or tributary of that prince.

#### *Coins of RĀJABĀLA.*

*Fig. 5.*—Round billon hemidrachma, weighing 37 grains; one of three in my own possession.

the same as the phallic Hermes, and the four-faced Indian Brahma. In fact the supreme Mahadeva in his threefold form of Brahma, Vishnu, and Siva, is the same god as Dionysos the Demiurgus. Schlegel and Keightley have denied the Indian origin of Dionysos; but in my opinion there is nothing more certain; and I hope hereafter to be able to establish my opinion. At present I will content myself with referring to the gem bearing the words NAMA ΣΕΒΕΣΙΩΝ which is pure Sanskrit signifying "glory to *Sabazios*," a well known title of Dionysos. See also Ausonius—Epiqr. xxx. "Dionyson Indi existimant."



*Obverse.* Diademed bust of the king in bold but rude style. Greek legend in late characters, incomplete on all.

BACIAEI BACIAECC CETHPOC PAZ

which may be corrected and completed thus :

ΒΑΣΙΑΕΩΣ ΒΑΣΙΑΕΩΝ ΣΩΤΗΡΟΣ ΠΑΖιοβαλον.

*Reverse.* Rude figure of Minerva Promachos. In the field two letters forming *Agā*. Ariano Pali legend quite perfect.

*Chatrapasa apratihatachakrasa Rājābālasa.*

“(Coin) of the Satrap RAJABALA, invincible with the discus.”\*

*Fig. 6.* One of four billon hemidrachmas in my own possession, weighing 36 grains. These specimens differ from fig. 5 chiefly in being of ruder execution : but one of them has the Greek name extended to PAZIOBA ; and all of them have the native title shortened to *Apratichakrasa*, which has exactly the same meaning as the other. In the field of the reverse are the letters *Hasti* which I refer to Hastinapura, the old lunar capital on the Ganges.

*Fig. 7.*—This is one of several billon specimens in my own possession, weighing 36 grains. The head is of still ruder workmanship and is quite flat at top. The native legend and monogram are the same ; but the Greek legend differs entirely. From a comparison of eleven specimens it appears to be

ΑΣΙΑ or ΣΥΙΑ ΠΟΗΣ ΙΥΙΡΟ ΠΙΣΙΟ ΣΤΡΑΤΙΥΣ

from which I make out conjecturally,

ΒΑΣΙΑΕΩΣ ΣΩΤΗΡΟΣ ΠΙΣΙΟβαλον ΣΤΡΑΤΩΝΟΣ.

This connection of the names of the Hindu princes Rājābāl, “the invincible with the discus,” and of the Greek king Strato, might justly have been disputed if these corrupt legends had been the

\* In Hindu mythology the discus, or quoit, is the favorite weapon of Vishnu ; but it is now used only by the *Akālīs*, or Sikh fanatics of the Punjab. Philostratus, *Life of Apollonius*, c. 27, relates that the king of Taxila in A. D. 45, “sometimes exercised himself with the *disc* and Javelin, after the Greek fashion.” In ancient times it would seem to have been in common use amongst the Greeks, as Homer relates that while Achilles sulked in his tent,

On ocean's shore his soldiers hurled the quoit,  
Or twanged the bow, or sped the quivering lance.

————— λαοὶ δὲ παρὰ ῥηγμῖνι θαλάσσης

δίσκοισιν τέρποντο καὶ αἰγανέησιν ἰέντες,

τόξοισιν θ'.

Iliad. II. 773.

only evidences of it. But I possess some very rude coins of Strato, which were found in company with the others and which were evidently the prototypes of these coins of Rájábála. Three of these pieces are engraved in the accompanying plate. They were found along with the coins of Rájábál in a ruined mound at Mathura. Their weight ranges from 36 to 37 grains.

*Fig. 8.* Shows the decline of Greek art, but the legends are still perfect. The Greek legend is ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΣΤΡΑΤΩΝΟΣ. The native legend is *Máharájasa trádatsa Stratasa*, which is a literal translation of the Greek. The other coins are still ruder, and their Greek legends have become corrupt, although their native legends remain perfect.

*Fig. 9.* ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΡΟΣΑ ΣΤΩΝΟΣ.

*Fig. 10.* ΒΑΣΙΛΕΩΣ ΣΩΤΡΟΣ ΡΟΣΑ ΣΤΩΝΟΣ.

As the native legends of these coins preserve the names and titles of Strato quite perfect, I can only conclude that the latter half of the Greek legend has been jumbled by the engraver of the die, and that the word ΡΟΣΑ has been formed by repeating the last three letters of ΣΩΤΗΡΟΣ, to fill up the blank left by the omission of the three letters, ΤΡΑ, of the name. If this conjecture is admitted the corrupted Greek legend of Rájabála's own coin, *Figs. 7*, may perhaps be explained in the same way.

I do not think that the issue of these rude coins can be attributed to Strato himself; but rather to the native princes who afterwards succeeded to his power. The gradual decline of the style of workmanship, and the corruptness of the Greek legends shewn in *Figs. 8, 9, 10*, make this conjecture the more probable. It is still further strengthened by the known facts of the want of a silver coinage amongst Indo-Scythians, and of the consequent currency of the drachmas of Menander and Apollodotus even to so late a period as the second century of the Christian era.\*

\* The following instances of the continuance of a sovereign's coinage long after his death may be worthy of notice. Feroz Toghlaq died in A. H. 790; yet we possess coins bearing his name dated up to A. H. 828. Husen Shah Sherki, of Jaunpore, was dethroned in A. H. 883, and died in 905, yet his coins may be obtained in a perfect series up to 918. Lastly Shah Alam of Delhi died in 1806; but the issue of coinage was continued in his name by the East India Company,

Another Greek prince whose coinage was re-issued and perhaps imitated by the native chiefs in their own names was Zoilus. *Fig. 11*, is a rude silver hemidrachma of this king, which was obtained in the Punjab. It is of the same type and of the same barbarous style as the coins of Strato and Rájabála, and it bears the same Ariano Pali mint-mark of two letters forming *Hasti*, which we find on the commonest coins of Rájabála.

Besides the coins which I have already described I possess five copper specimens bearing the name of Rájabála. They are of the same size, type, and style as the billon coins, and appear to me to have the traces of silver plating upon them. I do not therefore, consider them as a true copper coinage but as the base silver currency of the Punjab portion of Rájabál's dominions, in which they are now found. They bear different mint-marks from the billon coins but the legends are the same, with exception of the title which exalts the chief to a *Maháchatrapa* or "great satrap."

I have already identified the satrap Rájabála with Rájapála the last of the Mayúra kings of Delhi, who was conquered by Sákáditya, the chief of the Sákas or Indo-Scythians, who was himself overcome by Vikramáditya in 57 B. C. That this is the true date of these coins is rendered almost certain by the discovery of similar coins of a still ruder style, and therefore of a later period, which bear the name of Gondophares. Two of these coins are engraved as *Figs. 12 and 13*. The Greek legend is corrupt, and I cannot decipher more than the word BACIAΣIC but the Ariano Pali legend, which is not perfect on any one specimen, may easily be completed by a comparison of them all. It is the same as the simple legend which is found on the larger coins of this prince, *Máharájasa trádātasa Gondopharasa*. I have found most of these coins in the Punjab as far south as Multan, but a few specimens were procured to the eastward of the Sutlej.

The Satraps whose coins have already been described have been identified with the Hindu Princes of Delhi on the joint evidence of their similarity of names, of their contemporaneous sovereignty,

for nearly thirty years; and this coinage is still generally current after a lapse of forty-eight years.



and of the places of discovery of their coins being within the probable limits of the ancient kingdom of Delhi. The satrap coins and inscriptions, which yet remain to be described, have been found only in the western Punjab, excepting a few rare specimens from Jelalabad and Peshawur. The metropolis of this western Satrapy I would fix at Taxila, near Manikyála, where two inscriptions have been found which contain the names of three different satraps. Delhi and Taxila may therefore be considered as the eastern and western satrapies of the Indian portion of the great empire of the Indo-Scythians. Between these extreme points lay the satrapy or principality of *Cheka*, the ancient *Sákála*, which stretched from the *Pi-po-she* (the Vipása or Byas) on the east, to the *Sin-thu* (the Sindhu or Indus) on the west, and from the foot of the Rajaori hills to the confluence of the Punjab rivers.\* The Buddhists have celebrated the conversion of Milindu Rája of Sákala by their great teacher Nágárjuna, shortly after the commencement of the Christian era. Another king of She-ko-lo or Sákala is mentioned by Hwan Thsang as having reigned several hundred years before his time. This king he calls *Ma-yi-lo-kiu-lo*, who may possibly be the same as the *Mahigula* of our coins. Hwan Thsang travelled in India from A. D. 629 to 645. If therefore to 640 we add 150 B. C., the approximate date of Mahigula, we obtain 790 years as a fair measure of the vague statement of the Chinese traveller.

The Chinese name is spelt *Mo-hi-lo-kiu-lo* by Stanislas Julien,† who renders it most correctly by the Sanskrit *Mahirakula*. This may indeed be the true name on the coins, for the first two syllables of the name are found only on Mr. Bayley's specimen, and I read them at first as Mani. But we are not yet sufficiently conversant with the compounds of the Ariano Pali alphabet to pronounce positively that the letter *r* when preceding a consonant was omitted.

\* The northern boundary of Cheka was only two days' journey from Rájaori, that is the foot of the Punjab hills. While to the south Cheka possessed the dependency of *Meu-lo-sau-pu-lo*, or Multan. It therefore comprised all the *plains* of the Punjab, while the hilly districts were subject to Cashmere. The *Cheka* of A. D. 650 had in fact the same limits as the kingdom of Lahore in A. D. 1050.

† See *Histoire de la vie de Hiouen Thsang*, p. 459; and also *Fo-kwe-ki*, Appendix, p. 381.



In the words *dharma* and *varma*, as I will presently show, it was certainly used occasionally, although the former word is more frequently found in its Pali form of *Dhama*. But notwithstanding this uncertainty, I think there is a sufficient similarity in the names, and a sufficient approximation in the dates and countries of *Mahirakula* and *Mahigula*, to warrant a strong probability of their identity.

In describing the coins of the eastern satraps Jivanisa and Rájábála, we have had the valuable, although perhaps not quite authentic, aid of a few historical notices of the dynasty to which they belonged. But in describing the coins and inscriptions of the western satraps of Taxila, we must trust entirely to our own sagacity in making deductions more or less probable from the few ascertained facts. The fact that Taxila was tributary and not independent, is not solely derived from the coins, but is positively affirmed by Hwan Thsang, who states that in his time the royal race had become extinct, and that the country was then subject to the kingdom of Kashmir, although it had formerly been a dependency of the kingdom of Kapisa,\* that is of the Turki empire of Kabul. The coins belong to three different princes and are of different sizes and different types, but they are such evident copies of the commoner types of Azas, that there can be no hesitation in assigning them to the close of his long reign, that is to about B. C. 100 or a little later. One of these three princes, named *Aswavarma*, was certainly a tributary of the great Scythian prince, as we find the name of Azas, the "great king of kings," always occupying the Greek side of his coins. I will now describe the few specimens of the coinage of these western satraps, which have come to my notice.

*Figs. 14, 15, 16.* Small square copper coins, weighing 38 grains. The first is in my own possession; the second is from my unpublished plates of Bactrian coins, and the third is from Jas. Prinsep's Journal. These, with a fourth specimen, were all procured in the Punjab.

*Obverse.* Horseman copied from the coins of Azas: Greek legend, illegible.

*Reverse.* Male figure with right hand raised towards his head. The Ariano Pali legend is not complete on any of the specimens,

\* Stan. Julien, *Histoire de la vie de Hiouen Thsang*, p. 449.

but the title of *chatrapasa* is distinct on all of them. From its position in the middle of the legend, I conclude that the inscription begins with the name of the satrap's father on the right, and ends with his own name immediately beneath the standing figure. On fig. 15, the name reads invertedly *Mahava*, perhaps *Mahavarma*, but other and better preserved specimens must be obtained before we can decide upon the actual name of the satrap.

*Figs. 17, 18, 19.* Square copper coin of middle size—Ariana Antiqua, Pl. VIII. fig. 2, p. 331: from a coin belonging to Dr. Swiney. One specimen in Lady Sale's collection; three specimens in Mr. Bayley's cabinet, and one stolen from me in 1844. Of all these six specimens, I have sketches now before me.

*Obverse.* Horseman as on the coins of Azas. Greek legend, corrupt and incomplete on all the specimens.

Dr. Swiney,.....YOH...PA.....EICAT.

Lady Sale, PTAYOT .....

Mr. Bayley, PAYOIY-ATAHC-EIC.....

Author,.....XAPATIΛA .....

Mr. Bayley, .....PIAIΛ.....

*Reverse.* Maneless Indian Lion; Ariano Pali legend doubtful beginning on all the specimens with *trapasa*, which may be satisfactorily completed to *chatrapasa* by prefixing a single letter. The whole may perhaps be read as follows:

(*cha*) *trapasa Bhrahata Opha—aspasa putrasa.*

“(Coin) of the satrap Phrahates the son of ———.”

On comparing the Greek fragments with the Ariano Pali legend the Greek name may be read conjecturally as ΦPATAHE, or ΦAPA-TAHE, which would only be a variety of the well known name of Phraotes. Now, if we could believe the somewhat apocryphal travels of Philostratus, this was actually the name of two princes of Taxila, of whom the younger one was twenty-seven years old\* in the reign of the Parthian Bardanes, 44 to 47 A. D. But as the first Phraotes was the grandfather† of the other one, the date of the elder prince may be placed as high as 50 or even 60 B. C. This date is so

\* Philostr. Apollon. II. 27.

† Ibid—II. 31 —“My grandfather was a king, of the same name as myself, Phraotes.”

near that which may be assigned on numismatic evidence to the coins; viz. B. C. 90 to 60, that I should have no hesitation in identifying the elder Phraotes of Philostratus with the Brahata of the coins, if I felt as certain of the correctness of my readings, and as sure of the authenticity of the Greek sophist's travels. But until some better preserved specimens of these rare coins shall be found, we must perhaps rest satisfied with the conjectural reading which I have given. I will only add another guess that the name of the satrap's father which certainly appears to begin with the two letters *O* and *ph* may perhaps be *Omphis* which we know to have been the name of the king of Taxila at the time of Alexander's invasion of India.\*

*Fig. 20.* Round copper coin of middle size, weighing 156 grains. Common in Hazára and the Rawul Pindi district.

*Obverse.* Horseman. Greek legend in tolerably good characters, ΒΑΣΙΛΕΥΣ ΒΑΣΙΛΕΩΝ ΜΕΓΑΛΟΥ ΑΖΟΥ.

“(Coin) of the king of kings, the great Azas.”

Monogram before the horse formed of the two native letters *a* and *gam*.

*Reverse.* Minerva Promachos to the right. In the field a Greek monogram forming the syllable MIP, or MITP, and the Buddhist monogram of Dharma surmounted by a star or sun, the symbol of Buddha. Ariano Pali legend in bold and well formed characters.

*Indravarma-putrasa Aspavarmasa stratégasa jayantasa.*

“(Coin) of INDRAVARMA'S son, ASWAVARMA the victorious general.”†

These coins are amongst the most important of the long and interesting series of Indo-Grecian numismatics. The sovereign in whose reign, they were issued, is the great Scythian Azas: but the coins themselves were actually struck by a Hindu general, who, by his use of the monogram of Dharma, declares that he was a Buddhist, and by his assumption of the Greek title of *Stratégasa*,

\* Ktesias (Persica-Fragm.) has a similar name amongst the Persians, which he writes 'Ονόφας.

† My authority for assigning the value of *rm* to the compound letter which occurs in both of these names, will be fully stated when I come to speak of the coins of Kozala Kadaphes.



Στρατηγος, shows that he commanded a body of troops amongst whom some traces of Greek discipline still remained. Whether the victorious Hindu general was a mere soldier of fortune, or a tributary chief who furnished a stated quota of troops, and who had led his own clan to victory, can only be conjectured. But the prominent fact of his issue of coinage which in the east has always been one of the most highly-cherished prerogatives of a king, speaks strongly in favour of the royalty of Aswavarma. It is possible that he may have considered the foreign title of *Stratégos* as a higher distinction than his native rank of Rája, or satrap; or he may have waived the publication of his royal title out of deference, or in obedience, to his paramount sovereign Azas, the great king of kings.

The title of Strategos proves also that the Bactrian Greeks had introduced into India their own military grades, as well as their discipline, in the same manner as the British have since done. The extent of the Greek dominion and influence in the Punjab are only now beginning to be understood. In my account of the temples of Kashmir, I have stated my opinion that their pillars and ovolo mouldings owed their origin to the influence of Grecian art. Since then, Dr. Stevenson\* has made known three different inscriptions from the western caves, which record the name of a Greek architect, The name is variously written as *Dhanukakata*, *Thenukakata*, *Dhanukakadha* which Dr. Wilson supposed to represent the Greek Θεονικος. Dr. Stevenson prefers Ξενοκρατης; but I think that the native transcript would be more fairly represented by Δεινοκρατης, which was besides the name of the celebrated architect of Alexander the Great.

*Figs. 21 and 22.*—Round copper coins of middle size, generally attributed to Azas. They are always of very rude style, and specimens with even a few legible characters are extremely rare. See

\* Journal, Bombay Branch Royal Asiatic Society, Vol. V. p. 157. There are numerous verbal emendations which I think might be made in Dr. Stevenson's translations;—but I will only at present draw his attention to the opening of No. 5 inscription from Junir, which he reads *Isi mala sámínobhaya*. Now the first letter, which he takes for a peculiar form of the Swastika, is undoubtedly *Gri*, and the second, which he makes an initial *i*, is the figure 3, the opening being *Gri*: 3 or “three houses,” to which I presume the inscription refers.



Ariana Antiqua Pl. VII. fig. 11, and Jas. Prinsep's Journal, Vol. IV. Pl. XXII. figs. 6, 7 and 8. The two legends in the accompanying plate are from specimens in my own cabinet. Fig. 21, is a small coin weighing 64 grains; but it is the best executed specimen that I have seen of this type. Fig. 22, is a middle-sized coin, much corroded, but with the legend in better preservation than usual: weight 166 grains.

*Obverse.* A humped bull. Greek legend, usually incomplete and illegible. On fig. 21, however, it begins with BACI, and ends with AΘOY, or AMOY.

*Reverse.* A two humped Bactrian camel. Ariano Pali legend, always imperfect; but on fig. 22, the following portion of the inscription is in fine preservation. Maharajasa A—

By a comparison of the two legends, they may be completed respectively as follows:

BACIΛEΩC ACKA βαΘOY (or AMOY.)

*Maharajasa Aswapaté (or Varmasa.)*

“(Coin) of king Aswapati (or Aswavarma).”

The style of these coins is unusually rude, and the legends are always corrupt and defective. It is barely possible that they may belong to Aswavarma, the victorious; but as his coins, though executed in a stiff hard style, are generally in good preservation and very nearly complete in their legends, other specimens of these camel coins are much required for comparison, before we can venture to attribute them satisfactorily.

*Fig. 23,* is the inscription on a copper seal procured in the Punjab by Mr. Bayley. As the letters are reversed, this seal most probably belonged to one of these Indian satraps, who must have used it for stamping and authenticating his public documents. The Ariano Pali legend, has not been satisfactorily made out, but it appears to be

*Sivasena chatrapa Atri naram Pathanavaré.*

“(Sealed) by Sivasena, of the race of Atri, Satrap of Pothowar?”

The satrap's name may perhaps be *Sivapa*, as the opening letters may also be read *Sivapena*, instead of Sivasena. *Atrinaram* may be intended for “a man of the race of Atri,” although such a form of expression is certainly unusual. *Pathanawaré*, I think, may more

probably be considered as the original form of the present Pothowar, which is a part of the Rawal Pindi district. There is every probability however, in favour of the satrap's descent from Atri; for the salt range is still called *Jádon-ka-dáng*, or hills of the *Yádavas*, who were one of the two celebrated branches of Atri's descendants. Perhaps if we could obtain a complete list of the *Jádon Bhátis*,\* now settled in Jesalmer, we might find traces of Taxiles-Omphis, and of other chiefs, whose names are only found on coins and inscriptions. My list is much longer than Tod's, but is still very incomplete. A complete list may yet be procurable, for I possess one of the *Jádon* of Khiraoli, which extends to one hundred and twenty-eight names, from Krishna to the present Rája.

*Fig. 24*, is the inscription on the lid of the brass cylinder extracted by General Ventura from the great Manikyala tope, which I believe no one but myself has yet attempted to decipher. One of the names is still doubtful, but the remainder of the inscription seems to me to be perfectly clear. I read the whole inscription as follows:

*Swati Siva Chatrapasa Gandaphuka Chatrapa putrasa danatrayam.*

"The three gifts of the Satrap Swasti Siva, son of the Satrap Gandaphuka."

The last four letters of the inscription which, for want of room on the lid of the cylinder, are placed below, I read as *danatrayam*, "the three gifts." These, I suppose to refer to the three cylinders or relic boxes, which were deposited in the three separate chambers of the tope. The three deposits comprised the following articles.

Upper deposit at 12 feet from top. Iron (or copper) box enclosing a box of pure gold which amongst other things contained the following coins.

Gold coin of Oerki. *Reverse*. A four-armed seated figure with a crescent behind the shoulders styled MANAO-BAFO. This figure I take to be the four-armed OKPO, the Supreme God, or *Mahádeva*, who, like Jupiter Osiris, is frequently represented with the lunar crescent. *Vagisa* was a name of Vrihaspati or Jupiter in India, as

\* The people very simply and neatly distinguish between the Hindus and Musalmans of the same caste by varying the pronunciation. The Hindus are called *Bhátis* and *Játs*, the Musalmans, *Bhatís* and *Jats* (Bluttees and Juts).

*Βαγιστανος* was in Persia.\* *Manao* is no doubt the moon, and is the same word as the Doric *Mava* and Anglo-Saxon *Mona*.

One thin Sassanian silver coin.

Two Indo-Sassanian silver coins.

One thick silver (or electrum) coin of rude execution, but of strong relief.† I possess two duplicates of this coin in mixed metal containing gold, silver, and copper. One was obtained within five miles of Manikyála, and the other at Amritsar. The complete inscription is *Sri Yaso Varmma*, which was the name of the celebrated Rája of Kanouj, the rival contemporary of Lalitáditya of Kashmir, who reigned from A. D. 693 to 729. I do not infer from this that the great tope was not built until A. D. 700, but simply that the uppermost chamber, with its enshrined relic, was accessible until that date. In most topes the relic chambers were made accessible with the view of extracting the relic boxes for annual exhibition to the people. Kings and conquerors could of course command a sight of them at any time. I suppose therefore, that on his invasion of the Punjab Yasovarman may have inspected the relics of the great Manikyala tope, and that his coin may have been deposited in the relic box by the grateful Buddhist fraternity as a remembrance of his visit.

The *second deposit*, at a depth of 45 feet, consisted of a copper box enclosing a cylinder of pure gold. Nothing was found in this casket, but it is probable that there was an enshrined relic which was not observed on account of its minuteness.‡

The *third deposit*, at a depth of 64 feet, consisted of another copper box, enclosing a brass cylindrical box "cast and turned on

\* Both Diodorus, l. II. 13, and Steph. Byz. mention the Ὀρος Βαγιστανον. The name of the god who was worshipped there must have been *Bagis*, for Diodorus states τὸ δὲ Βαγιστανον Ὀρος ἔστι μὲν ἱερὸν Διός. Hence *Βαγιστανος* is the Sanskrit *Vagisa-sthána* or *Vagisthána*, the temple or place of Jupiter. As the common language in the times of the Achemenidæ appears to have been almost pure Sanskrit *Bagistán* is a preferable reading to Behistun, which Col. Rawlinson has adopted.

† Journ. As. Soc. of Bengal, Vol. III. p. 137.

‡ In one of the Bhilsa topes, the precious relic, enshrined in a crystal casket, was a piece of bone not larger than a common pea.



the lathe," inside which was another gold cylinder. With these caskets were found forty-nine copper coins and one gold coin, all belonging to the two Indo-Scythian princes Oerke and Kanerki, or Hushka and Kanishka. In the gold cylinder, there was a small piece of silver, about the size of a shilling, on which were engraved two lines of Ariano Pali writing: see fig. 25. The upper line may be read without hesitation as *Gomangasa* "of the emancipated," or more literally of "one who has abandoned the body;" from *guna*, abandoning, and *angga* the body. The second line I read as *Kanarakasa*, taking the first and fourth letters as cursive forms of *k*. No doubt this plain disc of silver, as Jas. Prinsep supposed, was "intended to explain the whole mystery." This mystery, I believe to be explained by my reading of the two words as *Gomangasa Kanarakasa*, or "(relics) of the emancipated Kanerki." According to this reading, the great tope of Manikyala was the Mausoleum of the Indo-Scythian Kanerki or Kanishka, the paramount ruler of Kabul, Kashmir, and the Punjab, about the beginning of the Christian era. The brown liquid therefore, most probably contained the mortal remains of the great Indo-Scythian emperor, mixed with a portion of sandal wood or other ashes from his funeral pile.

With regard to the three gifts of Swasti Siva, the satrap of Taxila, I suppose that they may have been either the three distinct deposits which were found in different parts of the tope, or the three separate boxes of the lower deposit only. The former, I think, is the more probable conclusion, as the uppermost deposit contained a gold coin of Oerke, who was an Indo-Scythian prince of as early a date as Kanishka himself.

I formerly thought that *Gomangasa*, "of the abandoned body" had reference to the tope which was built over the spot where Buddha had "abandoned his body" to feed seven hungry tiger-cubs. But the publication of Hwan Thsang's life by M. Stan. Julien, which gives much more detailed accounts of the Buddhist monuments of India, shows that the "tope of the abandoned body" was not at Taxila itself. In this part of Hwan Thsang's text there appear to me at least two mistakes. These are, 1st, his placing the *Sin-thu*, or Indus, to the north of Taxila; and, 2nd, his placing *U-la-shi*, or Urasa (the Varsa Regio of Ptolemy and the Rash district of the



present day) to the *south-east* of the northern frontier of Taxila. The pilgrim had already visited the districts on the western bank of the Indus, and was now on his way from Taxila to Cashmere. For *Sin-thu* I would read the *Sohan* or *Swan* river, the *Soamus* of Arrian, beyond which the pilgrim arrived at a great gate of stone,\* from which at a distance of 20 *li* to the south-east was situated the tope of the abandoned body. The high road from Taxila (or Manikyála), after crossing the Swan river, leads through the narrow pass of *Márgala*, or snake's neck, to Hasan Abdal. This rocky pass I take to be the "great stone gate" of Hwan Tshang, and the tope of Belar, near Osman Khátir, which is only about four or five miles distant† I take to be the "tope of the abandoned body." From this point, one district of *U-la-shi* bears north-east and not south-east.

I take this opportunity of again stating my firm conviction that Manikyala is the ancient Taxila. I do this because it has been stated in this Journal on several occasions, that I consider *Trakpari* to be the true site of Taxila.† On the contrary I have *always*

\* Stan. Julien, p. 89—"une grande porte en pierre." *Pass* is perhaps the true reading instead of gate; for the two words are the same in different languages: thus the Sanskrit *dwára*, a door, is the Afghan *darrá*, a pass, a narrow valley, and the Indian *ghát*, a pass, is the same word as the English gate. Dr. Atkinson refers the name of *Már-gala* to a great battle; but the parallel names of *Ghora-gali*, "or horse's neck," and *Gidar-gali* or "jackal's neck," applied to passes in the same country, proves the correctness of my version.

† I allude more particularly to Major Jas. Abbott's article on the battle-field of Alexander and Porus which contains the above statement. Sir H. Elliot believed that such was my opinion, and others may have done the same. In 1839 my brother first informed me of the village *Takhála*, and in 1848 I saw the village myself, which is within musket-shot of the tope. I again repeat my belief that this village *preserves the name* of the ancient Takkasila. Some further arguments of Major Abbott's may be seen in this Journal for 1853, p. 573. He there states that "in the name Maunkyala (read Manikyala) we have no resemblance to that of Taxila." Granted: but Manikyala is only the name of a village in the neighbourhood of the tope, and not the name of the tope itself. We know that the name of Taxila is as old as Alexander, and that the establishment of the Buddhist religion in Taxila is most probably not older than the reign of Asoka. There would not therefore, be any connexion between the names of the tope and city. Major Abbott thinks that the remains around Manikyala are "the ruins of the monastery of *Mainkialan* described by Hwan Tshang." But there is a fatal objection to this identification in the fact, that this monastery was in the valley of the Swát river, to the west of the Indus. See Fo Kwe-ki, Appendix 379.

believed and maintained that Manikyala was the ancient Taxila. In proof of this I quote the following paragraph regarding *Ta-chashi-lo*, which I published in this Journal upwards of six years ago. "This is the Sanskrit *Tak-sha-shila*, and Pali *Takkasila*, the *Taxila* of the Greeks, as noticed by Lassen. *It is undoubtedly the present Manikyala*, which is surrounded by ruins. One of the neighbouring villages is still called *Takkála*, a name of the same import as *Takkasila*, and most of the coins now procurable at Rawul Pindi, and in the neighbouring villages are brought from Manikyala."

*Fig. 26.* Part of the inscription extracted by General Court from a second tope at Manikyala. The portion which I have given is taken from the end of the 4th line. I have selected this part because it apparently contains the name of the elder of the two satraps of Taxila, who are mentioned in the other inscription. But the name is unfortunately doubtful, as the two copies which I possess of Genl. Court's inscription differ from each other, as well as from Genl. Ventura's inscription. I have ventured however, to read the name as Gandaphuka which I will retain for the present for want of a better or more probable reading.

The two inscriptions appear to me to contain the following important facts.

Genl. Court's inscription. "In the year 446 in the reign of Kanishka, Maharajah of the Gushang (tribe), the satrap Gandaphuka erected a tope (for what purpose I have not yet been able to decipher)." As a proof of his attachment to the Buddhist faith the inscription ends with the words, *Sacha-dhama-pidasa* "of the crown of the true *dharma*."

Genl. Ventura's inscription. "The Satrap Swasti Siva, son of the satrap Gandaphuka, made a gift of three relic caskets, for the purpose of enshrining the mortal remains "of the emancipated Kanerki or Kanishka."

The date of the former inscription I have read as 446 on the authority of a stone slab in my own possession which gives in regular order the nine numerals\* of as early a period as the Sah coins of

\* In 1852 I discovered that these numeral figures, from 5 to 9, were the initial letters of their *Pashtu* names written in *Ariano Pali*. Thus 5 is represented by *p* for *pinz*; 6 by *sp* for *spaj*; 7 by *a* for *avo*; 8 by *th* for *atha*, the *a* having

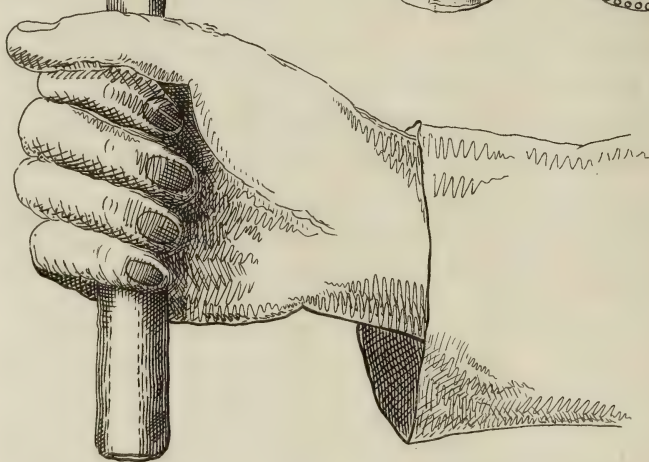
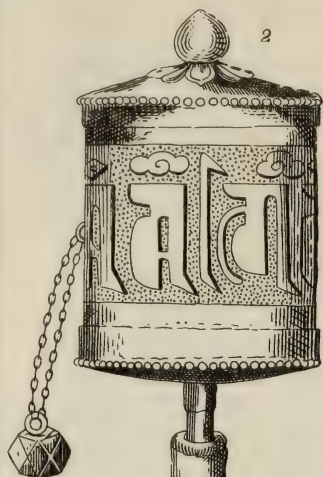
the satraps of Saurashtra. The date I would refer to the Buddhist era of the *Nirvāna* of Sakya Sinha, not as now established in 543 B. C. but as generally believed in by the early Buddhists for a period of several centuries. According to the Chinese Buddhists the Turki king Kanishka flourished 400 years after the *Nirvāna*, and the great Asoka was converted to Buddhism 218 years after the same event, or 182 years before the date of Kanishka's rule. Now as the date of Asoka's conversion was the year 259 B. C. the epoch of the *Nirvāna*, as generally accepted by the early Buddhists, must have been in B. C.  $259 + 218 = 477$  B. C. The difference between this date and B. C. 543 is 66 years, which is exactly the amount of difference between the Buddhist and Bráhmañical accounts of the length of sway of the nine Nandas. Taking this corrected date as our guide to the Buddhist chronology we obtain  $477 - 400 = 77$  B. C. for the accession of the three Turki kings Hushka, Jushka, and Kanishka; and as they are said by the Rája Tarangini to have reigned sixty years, we obtain B. C. 17 for the close of their sway. Now as the date of Genl. Court's inscription,  $446 - 477 = 31$  B. C. falls between these two fixed points of the accession and close of Kanishka's reign, there would appear to be some probability in favour of the correctness of my reading of the numerical figures.\*

already been used for 7—and 9 by *n* for *nah*. Even the 4 is a *ch*, but as the Pashtu word is *salor*, this form must have been derived from India. The first four figures are given in two distinct forms, the second set being the older; and the two forms show in the clearest manner how the straight horizontal strokes of Asoka's, and even of later days, gradually became the 1, 2, 3 of India, from whence they were transmitted through the Arabs to Europe. Dr. Stevenson, in *Bombay Journal*, Vol. V. p. 38, found "a striking resemblance between the character denoting a thousand, and the Bactrian S reversed," and after an examination of the rest he "thought it exceedingly probable that they were all derived from that source." This was in an article read on the 17th February, 1853. My own more complete discovery was made somewhat earlier, in the summer of 1852. Dr. Stevenson's discovery besides deals with the higher number of one thousand; mine with the units only. But our independent deductions are the more satisfactory as they were obtained from different sources.

\* As the *Harshakál*, or era of Sri Harsha, as recorded by Al-Biruni is within twenty years of this epoch, it is possible that the figured date of this text १२८८ may be a misreading for १०८. The difference of exactly 400 years between the dates of Sri Harsha and of Vikramaditya is, to say the least, very suspicious.







4. From Salimpur, near Panjtâr, Yusufzai.

Handwritten text in a script, likely Indic or Persian, arranged in three lines.

5. From Ohind, Yusufzai.

Handwritten text in a script, likely Indic or Persian, arranged in two lines.

But the date of General Court's tope may be fixed approximately by the age of the Roman coins which formed the silver portion of the deposit in the relic caskets. The dates of these coins, which range from B. C. 73 to 33, fix the latter date as the limit of antiquity which can be claimed for the tope; and as my date of B. C. 31 falls two years short of this, there is at least some probability in favour of its correctness. The age of the great tope, opened by General Ventura, may therefore be placed in B. C. 17 or a little later.

I am in possession of two other dated inscriptions of the Indo-Scythians which I brought from the Yusafzai country in 1848. The older of the two (No. 5 of the plate) is dated in the year 333, which being deducted from 477 gives 144 B. C. This is somewhat earlier than the date of 126 B. C. which is usually assigned to the actual overthrow of the Indo-Grecian power by the Indo-Scythians. The date is followed by the word *Chitrassa*, which I take to be the month of *Chaitra*. The other letters I cannot make out satisfactorily, excepting a few in the middle which I read as *miti* 44.

The other inscription (No. 4 of the plate) is dated in the year 390 or B. C. 87, at which time we know that the Indo-Scythians were in full possession of Kabul and the Punjab. The first line may be read, with only a little hesitation as to the name, as follows: *San 390, Srávanasa mása sudi prathame Mahodayasa Gushangasa rája*.\*\*\*

The letters which I have read as *Mahodayasa* might perhaps be read as *Maharájasa*: but the fact of the *Gushang*\* dominion and the date will still remain unaltered. The date is thus recorded: "In the year 390, on the first day of the waning moon of the month of *Srávana*."

I will now say a few words regarding the religious belief of the Indo-Scythian princes, which has already been the subject of conflicting opinions amongst the learned. Professor Ritter believed that they were Buddhists, and that the topes of the Kabul valley

\* The *Gushang* of the inscriptions I identify with the *Khushang* and *Kushang* of the coins, and with the *Kieu-shang* (waggoners or coaches) of the Chinese. And, as we find the Kanishka of the Rájah Tarangini become Kanerki on the coins, so do I believe that the *Kushang* or *Gushang* are represented by the Greek KOPANO of the coins, and the *χαρδαναϊος* of Ptolemy.

were erected during the period of their sway. Professor Lassen, on the contrary, *was*\* opposed to the Buddhist origin of the Kabul topes because the coins which are usually found in them bear Mithraic types.† But as both Roman and Sassanian coins are also found along with the relics, it is certain that the types of the coins can have no connexion with the religion of the founders; which must therefore, be sought for by a closer examination of the other objects. The most usual deposits in the Kabul topes were “caskets or vases of copper, brass, or steatite, in one of which was generally found a fragment or two of bone,” which Masson believed to have been the “essential relics over which the monuments were raised.”‡ In the larger vases were found burnt (decayed?) pearls, beads, rings, seals, and other trinkets with gems, coloured stones, pieces of crystal, fragments of mother-of-pearl, &c. Only in three instances did Masson find inscriptions “one scratched with a style around a steatite vase, extracted from a tope at Darunta; another written in ink around an earthen vessel found in a tope at Hidda; and a third dotted on a brass vessel, within a tope at Kohwát.”

The nature of the objects discovered by Masson in the Kabul topes is, in my opinion, quite sufficient to prove the Buddhistical belief of their founders. For the Buddhists alone, of all the people of India with whom we are acquainted, were in the habit of depositing precious stones and metals with the relics of their holy teachers. Thus we find it recorded in the *Maháwáṃso*,§ that Dutthagámini, king of Ceylon, after placing the relic casket in its chamber, made an offering of all the royal ornaments then on his person. This description satisfactorily accounts for the presence of finger rings and other ornaments which Masson found in the topes of Hidda, and which Lieut. Maisey and myself found in the topes near Bhilsa. The usual practice, which is continued to the present day amongst the Buddhists of Ladák, was to deposit a set of seven

\* I say *was*, because I am ignorant whether he still holds the same opinion. I presume however, that his opinion has long since been changed.

† See note, p. 184, of the English translation of Lassen's *Points in the History of the Greek and Indo-Scythian kings in Bactria, Kabul and India*.

‡ *Ariana Antiqua*, pp. 59, 60.

§ *Maháwáṃso*, p. 190.



precious things, either of metals and gems, or of gems only. The simple fact of the discovery of these precious things in the topes of Cabul and India is, in my opinion, a sufficient proof of the Buddhist faith of the founders. But there is other evidence on this point still more conclusive and satisfactory to be found in the inscriptions which are engraved upon the relic boxes. I need not refer to those of the Bhilsa topes, which I have already published,\* and about which there can be no doubt, but to the three inscriptions which Masson obtained from the Kabul topes. The principal of these was engraved on a steatite vase extracted from No. 2 tope at Bimáran, on the plain of Darunta near Jelalabad.

This important inscription consists of two lines; the upper line, which is engraved on the lid, being only an abbreviation of the longer one on the body of the vase. Both of these inscriptions open with the words†

*Bhagavána Sarirahi*

that is “(stupa) containing relics of BHAGWA’N,” or Buddha. Now the word *Sarira* is the very term that was used by the ancient Buddhists to designate the relics or mortal remains of the founder of their religion, or of some of his principal followers. This peculiar word, under the form of *sha-li-le*, is still used by the Chinese Buddhists, and with the same signification. Lastly, it is correctly spelt with the palatal sibilant ऋ, and not with the common s, स. The remaining words that are common to both lines of the inscription contain the names of the builder of the tope and of his father. Unfortunately some of the letters of these names are of unusual form, but the concluding word *putrasa* proves that the preceding letters must contain two names. I read this part of the inscriptions as follows:

*Sri Tabāchitrassa Khamaspada putrasa,*

“(Gift) of Sri TABACHITRA, the son of KHAMASPADA.”‡

The date of this tope may, I believe be safely ascribed to the close

\* See “Bhilsa Topes,” p. 298

† See *Ariana Antiqua*, Pl. II. of antiquities.

‡ The shorter inscription ends with four letters of which the first two appear to be *d* and *n*, for *dan*, a gift. The other two letters are doubtful. I read this inscription as follows:



of the reign of Azas, or about 90 B. C. For the relic chamber, which had evidently not been disturbed since the day on which it was first closed, contained, along with the usual quantity of gold ornaments and gems, four copper coins, all of which are of a well known type of the great Scythian king of Azas. As no other coins were found in this tope, the soundness of this conclusion is, I think undeniable. If this be admitted we have a clear and decisive proof of the prevalence of the Buddhist religion in the Kabul valley nearly one century before the Christian era. But as this fact is still doubted by at least one distinguished orientalist, I will now add another proof of a still earlier date.

All our most distinguished numismatists, French, German and English are agreed on one point, that the last prince of the Greek kingdom of Kabul was Hermæus, and that his immediate successor was the Indo-Scythian Kadaphes or Kadphizes. The date of the Scythian conquest is variously stated, but the extreme difference is less than thirty years. Raoul Rochette\* assigns this event to 125 B. C. Professor Lassen† to 120 B. C. and Professor Wilson‡ to 98 B. C. The near agreement of such excellent authorities may be considered as fixing the close of the Greek dominion in India in the latter end of the second century before the Christian era. This point being established, I now proceed to show that Kadaphes or Kadphizes, the subverter of the Grecian dominion, was a staunch Buddhist.

The coins of Kadaphes, which are of a single type, always bear the same inscription without the change of a single letter. On the Greek side we find in small neat characters,

ΚΟΖΟΛΑ ΚΑΔΑΦΕC ΧΟΡΑΝCΥ ΖΑΘΟΥ.

“(Coin) of *Kozola Kadaphes*, king of the *Koransu*.”

The Ariano Pali legend of the reverse, which is also in small neat

*Bhagawána-sarirahi Sri Tabachitrassa Khamaspada putrasa dana.*

“(Casket) containing relics of BHAGWA’N, the gift of Sri *Tabachitra*, the son of *Khamaspada*.”

Two similar instances of relic *gifts* occurred amongst the Bhilsa tope deposits.

\* *Journal des Savants*, 1835, p. 595.

† Lassen’s *Greek and Indo-Scythian kingdoms of Cabul*, p. 283.

‡ *Ariana Antiqua*, p. 292.

characters, has never yet been fully read. This was partly due to the new style of the titles, and partly to the unusual forms of some of the characters. But my recent discovery of the true forms of the numismatic *ch*, and of its aspirate *chh*, now enables me to give what I believe to be a satisfactory rendering of every letter of the inscription. My reading is (see fig. 27).

*Khushanga Yathaasa Kujula Kaphsa Sachha dharmapidasa.*

“Coin of the king of the Khushang Kujala Kaphsa, the crown of the true *Dharma*.”\*

The coins of Kozoula Kadphizes differ altogether from these in size and type and in the Greek legend, but the native legend is almost the same. They bear also two distinct Greek legends although the types and native legends remain the same. The earlier coins have ΒΑΣΙΛΕΥΣ ΣΤΗΡΟΣ ΣΥ ΕΡΜΑΙΟΥ, and were probably struck by the conqueror during the life time of Hermæus. The later coins have ΚΠΖΗΥΑΠ ΚΑΔΦΖΟΥ ΚΠΡϚΠ on the Greek side, and on the reverse in bold and well formed Ariano Pali characters the legend (see fig. 28.)

*Kujula Kasasa Kushanga Yathagasa Dhamapidasa.*

On a single well preserved specimen (see fig. 30) I find instead of the single letter *m* in the Pali word Dhama, a compound which I take to be *rm*, thus giving the Sanskrit form of *Dharma*. This compound letter may in fact be easily resolved into the Ariano Pali forms of *r* and *m*, the latter having the right horn of the crescent lengthened upwards.†

The same compound letter occurs twice on the coins of Aswvarma (in fig. 20) in positions which seem to confirm the correct-

\* I have considered ΖΑΘΟΥ as a royal title, equivalent to the Sanskrit *Kshatra*, of which we have various Greek forms; *Evartsης*, *Eastsης*, *Evastsης*, *Eastsης*. The last is nearly the same as that on our Indo-Scythian coins. *Zatha* or *Yatha* may however, be the name of a people, the ancestors of the modern *Játs*. The inscription would then be “(coin) of the Kushanian *Ját*, Kujula Kaphsa, the crown of the true *Dharma*.”

† *Piḍa*, पीड, a chaplet or crown, is the Sanskrit word. The compounds *Dharma-piḍa*, the “crown of the *Dharma*,” and *Sachha-dharma-piḍa*, the “crown of the true *Dharma*,” are I believe, unusual; but they are grammatically correct, and eminently Buddhistical. We have an analogous title in the *Tāj ud-dīn*, or “crown of religion” amongst the Musalmáns.

ness of the value which I have assigned to it. The differences in the spelling of the names of Kadaphes and Kadphizes I would refer to the issue of different mints, for the coins of Kadaphes are found only in the western Punjab: and those of Kadphizes in Jelalabad and Kabul: the former were most probably minted at Taxila; the latter at Dionysopolis and Kartana.

The constant assumption on all his coins of such common and well known Buddhist titles as *Dharma-pida* "crown of Dharma" (or the law of Buddha) and *Sachha Dharma-pida*, or "crown of the true Dharma," at once stamps king Kadaphes as a staunch Buddhist. The coins of Kadaphes moreover, are marked with a peculiar monograph which is found only upon his coins, and upon those of the single type of Azas, which was discovered in the tope of Hidda.

The proofs which I have given above of the prevalence of Buddhism in the Kabul valley towards the close of the reign of Azas in B. C. 90, and during the whole reign of Kadaphes from B. C. 120, are I think amply sufficient to dispel the doubts even of the most sceptical. In my work on the Bhilsa topes I have already proved the trustworthiness of that portion of the Mahāwānso which treats of the proceedings of the third Buddhist synod and of the consequent dispatch of Buddhist missionaries to convert the people of various neighbouring lands.\* Amongst these, was the *Yona* or Greek country of which the capital was Alasadda, or Alexandria. The date of this event was 241 B. C. in the twenty-third year of Asoka's reign, and the fifteenth year of Græco-Bactrian independence, from which period therefore, we ought to date the establishment of Buddhism in the Kabul valley. Another, and an equally independent proof of the accuracy of this portion of the Mahāwānso is afforded by the Chinese pilgrim Hwan Thsang who saw a stupa at *Na-kie-lo-ho*, or Nagrihar, near Jelalabad which was *built by the king Asoka*.

I will now say a few words regarding the religion of Kanishka and the other Indo-Scythian princes of Kabul and the Punjab, whose Buddhism has been doubted on account of the Mithraic reverses of their coins. The Rāja Tarangini† expressly mentions that during the long reign of the three Turushka (or Turki) kings Hushka,

\* Bhilsa Topes, p. 120.

† Book I. V. 170, 171.



Jushka and Kanishka, Kashmere was in the hands of the Buddhists, and that the kings themselves built monasteries and temples for the worship of Buddha. The memoirs of the Chinese pilgrims Fa Hian (A. D. 400) and Hwan Thsang (A. D. 640) also ascribe the foundation of numerous topes in Peshawur, and Gandhára to the prince *Ki-ni-kia* or *Kia-ni-se-kia*, that is to the Kanerki of the coins and the Kanishka of the Rája Taringini. I have no doubt therefore of the Buddhistical faith of the princes themselves, but I believe that the old Sabæanism of the east, which is fully represented on the reverses of their coins, was still the prevailing religion of the people. The first Kadphizes who calls himself “the crown of the *Dharma*” on the reverses of his coins, yet places a figure of the Grecian Hercules within the circle of the legend. In a similar manner the Indo-Scythian Oerke or Hushka who is seen with a Buddhist prayer cylinder in his hand on the obverses of his gold coins,\* yet gives representations of the sun and moon, and of the five elements on their reverses. The Buddhist religion was eminently a tolerant one, and I presume that the Buddhist princes may have placed these Sabæan figures on their money with the sole view of gratifying the mass of their subjects amongst whom it was to circulate.

The last coins which I shall notice, are those of the family of Gondophares, which are highly interesting for several reasons: but more particularly on account of the very strong probability that this Gondophares is identical with the king Gundaforus who put Saint Thomas to death. The coins of Gondophares are common in Kabul, Kandahar, and Sistan, and in the western and southern Punjab. All these countries therefore, must have owned his sway. He was besides the head and founder of his family as no less than three members of it claim relationship with him on their coins: *Orthagnes*, his full brother, *Abdagases* his nephew, and *Sasa* (or

\* See the accompanying plate of Indo-Scythian relics, in which fig. 1 represents the Tibetan prayer-cylinder of the present day:—fig. 2 is a bronze badge, and fig. 3 is a coin of Oerke, both representing the prayer-cylinder in the manner in which it may now be seen in the hands of the Buddhist Lamas of Thibet. The prayer-cylinder was certainly in use in Ladák as early as 400 A. D. when Fa Hian visited that country.



*Sasan*) a more distant relation. The coins of Orthagnes are found in Sistan, and Kandahar; those of Abdagases and Sasan in the western Punjab. I presume therefore, that they were the viceroys of those provinces on the part of the great king Gondophares, who himself resided at Kabul. All the names are those of Parthians, but the language of the coins is Indian Pali. Abdagases is the name of the Parthian chief who headed the successful revolt against Artabanus in A. D. 44. The great power of Gondophares, and the discovery of a coin of Artabanus countermarked with the peculiar monograph of all the Gondopharian dynasty, make it highly probable that the Indo-Parthian Abdagases was the same as the Parthian chief, whose revolt is recorded by Tacitus\* and Josephus.† This surmise is very much strengthened by the date of the revolt, A. D. 44, which would make Gondophares a contemporary of Saint Thomas.

The peculiar monograph of all the coins of this dynasty affords a most curious and striking proof of the prevalence of the Indian language beyond the Indus. At first I thought that the name of Gondophara‡ was some compound of Phra or Phara which is found in so many Parthian names. But about three years ago when I was sketching a sugar-mill, the true meaning of the name flashed suddenly upon me. I have given a sketch of the common Indian sugar-mill in fig. 31, in which it will be observed that the outer channels for the cane-juice are chiselled in the very form of this peculiar monograph, which therefore, must be a pictorial representation of the compound name *Gánda-phor* गाण्डकोड, or "sugar-cane crusher." I have never heard this term used, but it is regularly formed, and is in strict keeping with *Káth-phor*, the "wood-breaker," and *Pathar-phor*, or the "stone-breaker," which are the common names of the wood-pecker.

My object however, is not to speak of Gondophares himself, but of his relative Sasa or Sasan, whose coins exhibit the very same

\* Annal. XV.—2

† Antiqua, XX. iii.—2, Josephus calls the father of Abdagases, *Kinnamos*: Tacitus names him *Sinnakes*.

‡ On the bust coins the name is ΤΝΔΟΦΕΡΡΟΥ: on the horseman coins it is ΓΟΝΔΟΦΑΡΟΥ. The native legend however, is the same on both, "*Gondophara*."

forgetfulness of propriety, which I have already described as shown by those of Kozoulo Kadphises and the Indo-Scythians. Thus Sasan also calls himself the "crown of the true Dharma," in a neatly engraved legend placed around a figure of Jupiter holding out a victory! There are two different types of the coins of Sasan; the one rare, the other common, both of which I will now describe.

*Fig. 29.* Round copper coin of middle size weighing 151 grains—rare. See R. Rochette, Pl. II. fig. 16, and *Ariana Antiqua*, Pl. V. fig. 19: also Pl. XV. fig. 2 of my unpublished plates.

*Obverse.* Horseman as on the coins of Azas. Greek legend always corrupt and incomplete, but on some specimens the letters ACHC are legible below the horseman. Before the horse the Gondopharian monograph.

*Reverse.* Jupiter standing and holding out a figure of victory. Ariano-Pali legend complete, excepting only a few letters which I have supplied without hesitation, as the wanting letters are too obvious to be mistaken.

*Mahárájasa Rájadhirájasa sachha dha (ma-pidasa) Sasasa.*

"(Coin) of the great king, the king of kings, the (crown) of the true Dharma, SASA."

*Fig. 30.* Round copper coin of middle size, weighing 156 grains, see *Ariana Antiqua*, Pl. V. fig. 20; and my unpublished plate XV. figs. 1, 2, 3—common.

*Obverse.* Horseman as on the other, but the Greek legend is always jumbled.

*Reverse.* Jupiter with the *hásta-pura*, moving to the right. Ariano-Pali legend in bold legible characters.

*Mahárájasa Mahatasa trádatasa Deva-hadasa Gondophara Sasasa.*

"(Coin) of the great king, the mighty, the preserver, (of the race) of the divine Gondophares, SASA."\*

I have taken *Deva-hada* to be the Pali equivalent of the Sanskrit *Deva-hridya*, देवहृद्य, the "god-hearted," of which we have a counterpart in the Greek Θεοτροπος. I have before me about thirty good

\* The Ariano-Pali name is written *Sasasa*, which I take to be the same as the well known name of *Sassan*, the progenitor of the Sassanian dynasty. I possess about thirty legible specimens. It is possible that this *Sasa* or *Sassan* may have been the ancestor of Ardshir the son of Babek.

specimens of this type, all of which agree in every letter of the legend. There is therefore, no doubt about the reading of the letters.

I cannot close this account without saying a few words in favour of my claim to the discovery of the true values of eleven letters, or of just one-third of the Ariano-Pali alphabet. The whole number of single-letters amount to thirty-five, of which Jas. Prinsep had assigned the true value to seventeen, or just one-half. To Mr. Norris is due the discovery of six single letters of which two are the monumental forms of *ch* and its aspirate; and the form of one letter *jh* still remains unknown. Of the nine known vowels (five initial and four medial) seven were determined by Jas. Prinsep, and two by me. Of the few compound letters which are at present known, the numismatic *anuswara* was discovered by Jas. Prinsep, the monumental one by Mr. Norris: but the attached *r* in *kra*, *tra*, *dra* and *stra*; the attached *t* in *st*, the attached *m* in *rm* are all due to myself. The single letters of which I claim the discovery are *g*, *gh*, *ng*; *ch*, *chh*; *t*, *d*; *ph*, *b*, *bh*; *v*; all of which, with the exception of the fourth and fifth, were made known in this Journal before the publication of Mr. Norris's alphabet in the Journal of the Royal Asiatic Society for 1846.

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Examination and Analysis of two specimens of Coal from Ava, by
H. PIDDINGTON, *Curator Museum Economic Geology.*

I am indebted for these two specimens to Captain Niblett of the H. C. Steamer *Sesostris*. Of No. 1, we have a capital supply of a maund or more, but of No. 2, we have only a little in a box; but quite sufficient to shew that it is altogether a different coal even by inspection: and with specimens of coal these remarks are not superfluous, for it is only by a good large supply of the coal that its quality can be fairly judged of and fair samples taken for analysis.

No. I.

SEMI-BITUMINOUS COAL.

No locality has been given with these specimens but we have in the collections of the Museum specimens in Major Burney's series

from Ava (Journal Vol. I. 1832) exactly resembling both these coals, and Mr. Jas. Prinsep, Vol. VII. p. 198, gives an analysis of a jet coal which is there entitled as, "From Kyendwen River;" and that specimen which closely resembles No. I. is labelled, "*From the sand banks Kyendwen River;*" so that the banks of this river are probably the locality of both of them. Both are moreover only "top coals" and thus we are no doubt giving an examination of inferior specimens to what the deeper beds will furnish when mined.

This coal is of the class which would be called semi-bituminous or steam-coal at home. It is tolerably tough and in alternating bright shining and dull laminae, the proportion of the dull ones being much the largest. The bright laminae are brittle and cannot be cut, the dull ones yield to the knife like jet-coal.

It flames well but does not melt, and its fine powder has the peculiar quality of coking to a tough and almost flinty coke in the crucible, which requires smart pounding to pulverise it.

The coke of the coal itself is of a bright steel grey, and with a close texture, the coal swelling a little and separating at the laminae but retaining partially its shape. It burns very slowly, even when pulverised, and the ash is of a pale fawn red.

The smoke of the gases has the agreeable smell of good bituminous coal.

It is nearly free from sulphur of which there are only traces.

Its specific gravity is, 1.28

Its contents in 100 parts are :

Water (by independent experiment,	4.25
Gaseous,	26.50
Carbon,	67.85
Ash (pale red),	1.40
	<hr/>
	100.00
	<hr/>

This coal has then, evidently, all the properties of a first rate steam-coal; and I place below the analysis of two of the choice Welsh steam (red ash) coals.

	Ava coal, No. I.	Pont-y-pool† <i>Musket.</i>	Rosser-Wiliam's‡ <i>Musket.</i>	Remarks.
Gaseous,	30.75*	28.50	30.00	*with water.
Carbon (coke), ..	67.85	69.00	68.50	†a well known coal.
Ash,*	1.40	2.50	1.50	‡Mynyddysburgh vein.

So far then as laboratory research will inform us this is a first rate coal; but I need not remark that the character of all coals depends greatly, especially in India, first upon how they are burned, and again that they are fair averages from the mine; and indeed with reference to No. II., if it is from near the same locality, that this coal, No. I. be not adulterated by a mixture of it. As to the burning, there can be no doubt that between the effects of climate the negligence of the stokers, and often the little attention paid by the engineers, much of our heating power has been wasted in India.

NO. II.—INFERIOR JET COAL.

This is a dull, slaty-looking coal, dividing in the weather-worn specimens into very thin laminæ and having on the weathered edges orange-red iron-stains.

It flames well and does not melt. Its powder does not coke at all like No. I. nor does the coal (as might be expected) shew any signs of coking; a lump of it in a closed silver crucible giving off its gas very readily but scarcely altering in appearance.

It contains a small portion of pyrites which are seen to have decomposed on the surface and between the laminæ in small spots.

Its specific gravity is 1.42.

Its contents in 100 parts are as follows, and I place next to my

* I have noted above that our coal and Welsh coal are all red-ash coals. The Pontypool ash contains lime, which ours does not.

results Mr. Prinsep's from his specimen Journal Vol. VII. p. 198, which are evidently not from the same coal, though from its appearance, it might be taken for it.

Our present jet coal.		Kyendwen coal.	
H. Piddington.		Mr. J. Prinsep.	
1854.		1832.	
<hr/>		<hr/>	
Sp. Gravity,	1.42		1.363
<hr/>		<hr/>	
Water,	11.88		8.00
Gaseous,	32.12		40.00 (32.00, less
Carbon,	32.60		54.00 [water].
Greyish white ash; does not effervesce,	23.40		5.90
<hr/>		<hr/>	
100.00		107.90	

There is evidently some error of the press in Mr. Prinsep's table, but we can only conjecture that it may have happened that he forgot to subtract the 8.00 of water from the gaseous (volatile) result in the first operation when he had ascertained it as usual by an independent experiment which would leave 32.00 for the gases properly so called. Mr. Prinsep has not noted the colour of his ash which would perhaps enable us to ascertain if it was the shale of No. I. It is certain that No. II. is not the mere shale of No. I. on account of the difference of colour of the ash.

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*Literary Intelligence.*

A Catalogue of the Sanskrit MSS. in the Royal Library at Berlin, by Dr. Weber, is the first of a series of catalogues of the MSS. in that Library which has been in progress since 1842 by order of the Prussian Government, on which the undertaking reflects great credit. The plan originated with Dr. Pertz, on his being appointed chief librarian of the Royal Library at Berlin, and at his suggestion Government directed that the first grants should be assigned to cataloguing the oriental MSS. As to the form of the catalogue it

was agreed to specify the number, material, form, binding, number of pages and contents of each volume, and to notice any obvious lacunæ of the text or other deficiencies, appending at the same time a systematic table of contents, and a double index of authors and works, alphabetically arranged.

Dr. Röer has kindly drawn up from Dr. Weber's introduction the following sketch of the growth of the Sanskrit collection in this library.

"The first purchases in the Sanskrit department were made by the late Professor Wilkens, the immediate predecessor in office of Dr. Pertz, who bought in 1827 several MSS. which were formerly in the possession of the Serampore College and had been acquired by Professor Bernstein during his stay in England, viz. Nos. 456, 463 and 485 (three Purāṇas) 831 and 838 (arithmetic and astronomy), 1335 (prayers) and 409 (Bhagavadgītā). During his visit in England in 1829, Wilkens purchased through Messrs. Trenttel and Wurz, for £400, a collection, consisting of 205 Arabic and Persian and of 16 Sanskrit MSS. made by J. Murray since 1796: and in 1834 he was fortunate enough to acquire, by the mediation of Fr. Rosen, at the comparatively moderate cost of £105, a fine MS. of the Mahābhārata, including the Harivansa, with several commentaries, in 9 vols. folio, (Nos. 392 to 400): the latter formerly belonged to Sir G. Haughton.

"The Chambers' collection forms the most valuable part of this section of the Royal Library MSS. Dr. Pertz thus details the history of its acquisition.

"This valuable collection was made in India during the last quarter of the 18th century. Sir R. Chambers, an eminent man of thorough and various attainments, collected during his residence in Calcutta from 1774 to 1799, an Indian Library of great importance, and acquired, at a cost of £25,000, it is said, a great number of MSS. unparalleled as regarded Vedic literature and containing many important works in other branches of Sanskrit literature. From the papers, added to this collection, it appears, that soon after his arrival in India, he entered into communication with distinguished native scholars; thus he consulted pandit Mana Krishna Tripatti on the Veda literature, on the Sāma Veda, Ananta Rāmarāja, on the

Yajur Sheve Kumjee Doobeh, and on the literature of the Purāṇas Harināma Kaula, who is mentioned as Harry Ram Cowl, and devoted a particular attention to the examination and the acquisition of legal works. The collection of pandit Govardhana Vyāsa, which contained among other works 6 Purāṇas, and also those of Devadatta Ojhā, of Krishṇadatta and of Siva Lāla Ojhā, were purchased in 1783, and in 1785 Sir Robert acquired a number of pieces of the Sāma Veda from Ibrahim Vaha.

“The 78 MSS. bearing dates from Samvat 1831 to 1855, are probably transcripts made by order of Sir Robert. The copying of the Vedas, according to a statement of the last owners, has cost about £1000. The collection contains a few MSS. of the 14th century and several of the 15th; their number increases in the 16th, and attains its maximum in the 17th, although it is still considerable in the 18th century. Even in India it attracted great attention, and many references were made to it.

“In 1799 Sir Robert returned to Europe with broken health, and after his decease, in 1803, the collection remained in the possession of his family. Several negotiations to sell it to the British Museum, the Russian and Bavarian Governments, were not successful. Ch. Wilkens drew up, in 1825, a catalogue for the British Museum, but the sale of the collection was not effected in consequence of the high price asked for it. Some years afterwards, W. von Humboldt conceived the idea to acquire those MSS. for Prussia, and proposed to the Government to make an offer of 30,000 Thalers Courant. The sum, however, appeared too high, and the proposal was declined. In 1829 Fr. Rosen, at the request of Lady Chambers, made a catalogue of the collection, 210 in number, which was published in order to bring the treasures of the collection to public notice. This measure also failing, Mr. Robert Chambers, after the death of his mother, had a new catalogue prepared by Mr. Forbes, which was printed in May, 1841. The public was at the same time informed by it, that the sale of the collection would take place on the 13th April, 1842. Thereby induced and on the urgent entreaties of Lassen and Höfer, Chevalier Bunsen, then Prussian ambassador in London, again took the matter up, and by a cabinet order of the king of Prussia of the 20th May, the



purchase of the collection was sanctioned. No offer having been made on the 13th April, and one by the French Government after the day of the sale not having been agreed to, the negotiations on the part of Prussia were carried on by Ch. Bunsen through Professor Höfer, and on the 20th May the purchase was effected for the sum of £1250.'

"On the plan of his catalogue Dr. Weber remarks (p. xxii. preface),—'After the names of the author and the work have been given, it is stated, where and by whom the work has been edited. Then follow the number of the chapters and of the pages, with the signature of the copyist, the date of the copy, the extent of each chapter, the number of its verses, and its name. Then the commencement of the work is given together with such dates from its introduction and its close as may throw light on the person and the circumstances of the author and the time he wrote. When describing works of importance and especially such as have been hitherto unknown, I have added the commencement of each single chapter and sometimes also other extracts; on the other hand, I have given as short a notice as possible of works which have been published, or are in the course of publication, unless the MS. exhibited a great difference from the published text.

"'The arrangement of the different parts depends upon the place which they respectively occupy in the literary history of India, and in this respect I refer to my lectures on the history of Indian literature. Within every division I have arranged the numbers, as far as practicable, chronologically, with this restriction, however, that the commentaries and similar writings are placed next to those works which they explain, or of which they treat.'

"This arrangement of his literary materials is in accordance with the rules of logical analysis, and Dr. Weber was fully justified in rejecting the division of old Hindu writers by which the whole body of Sanskrit literature is classed under three principal heads which have 14 subdivisions. That part of the catalogue which refers to Vedaic literature, is the most comprehensive, but the whole work has been executed in a scholarly manner and with great accuracy. Dr. Weber's lectures, above quoted, have solved and elucidated many questions previously obscure or lost sight of.

“Catalogues such as these are not only a saving of time and trouble to the literary student, but are, moreover, guides to the discovery of works, buried and, for all practical purposes, lost in libraries of private individuals, who, in not a few cases, knew not, and, in others, act as though they knew not, the value of the treasure and the trust of which they are accidentally the custodians. This remark applies with especial force to the known stores of Sanskrit literature, a history of which has never been attempted by Hindu writers, what is known of it being mostly derived from general classifications and occasional notices and references, found in works dedicated to scientific research. There are a large number of Sanskrit works, unknown even to native scholars, notwithstanding that they are within the range of their particular studies, and such works ought surely to be preserved in the archives of a public library, where alone they can assume the due and practical importance which belongs to them. The several collections of Sanskrit works, made chiefly by Englishmen towards the close of the last and the opening of the present century, may embrace as valuable a portion of Sanskrit literature as any that may yet remain hidden, still the known, compared with the unknown, is probably but a fraction, and not a considerable one. For a collector of MSS. it is of the highest importance to know, whether a work with which he may meet, is already to be found in collections, information which can only be obtained from published catalogues. The collection of Fort William as well as those of the Sanskrit Colleges of Calcutta and Benares respectively have been embodied in the catalogue, printed by our Society, which however is very imperfect and often incorrect. Professor Hall is now preparing a descriptive catalogue of the Sanskrit collection in the Library of the Benares College, and has already met with a great number of works in all branches of Sanskrit literature, works hitherto unknown to us.”

Dr. Röer's concluding remarks on the value of Catalogues are quite to the point and his strictures on our Society's Sanskrit Catalogue, compiled so far back as 1838, merit the attention of our Philological Committee. A revised English Catalogue of our MSS. in the *Raisonné* form, such as we now have for the St. Petersburg, Leyden and Berlin collections, is a great desideratum, and it should

embrace all the Sanskrit MSS. traceable in private collections in the neighbourhood of the Presidency. It is probable that such native gentlemen as have MSS. would cordially respond to any invitation to produce them, which might emanate from the Society.

The Royal Asiatic Society has just published a descriptive catalogue of 163 Arabic and Persian MSS. which form the historical portion of its collection. The work is edited by Mr. Morley, and contains a short analysis of each history, mentioning where extracts have been published by Sir H. Elliot. It further gives such information as is available of the author of each work, and describes the exact size of each volume. Garcin de Tassy has noticed some of the more important MSS. of this collection in a late No. of the *Journal Asiatique*.

In No. 12 (May and June) of this same Journal M. Defrémely commences a paper entitled 'Nouvelles Recherches sur les Ismaéliens ou Bathiniens de Syrié,' better known under the designation of Assassins. The author announces that he has had access to sources, some of which were not consulted by Falconet, De Sacy and Quatremère and others of which were far from being exhausted by them. A paper by M. Garcin de Tassy follows on the proper names and titles in use by Musalmans, and the No. concludes with a list, alphabetical and chronological, of the names given by Chinese emperors to the years of their reigns from the Han dynasty downwards, and drawn up by M. de Meritens. M. Chodzko replies to the Kazan professor's criticisms of the new system of pronunciation introduced into his Persian Grammar. The No. concludes with an obituary notice of M. Marcel, one of the founders, and since 1847 a 'Censeur' of the Paris Society.

The July No. contains M. Mohl's Annual Report from which it will be seen, that the object of the recent changes in the mode of publishing our *Bibliotheca Indica* is appreciated in Europe. The learned Secretary's remarks on the value of such collections as are now being published in Paris as well as in Calcutta are striking. The Chinese and Tibetans have long since anticipated us, the collection in the former language made by the emperor Kienlong, being represented to equal in size about 30,000 vols. of an European library. The Turks at Constantinople and



the Armenians at Venice are yet engaged on the publication of a series of their national authors. The 'colossal enterprize' of our own Elliot is noticed in connexion with this subject, and with a touching allusion to the heavy loss occasioned by his death.

No. III. of the *Zeitschrift* of the German Oriental Society opens with a notice, by Professor Pott, of the recent contributions to Comparative Philology in the works of Norris, Rüs and Crowther on several dialects of Central and Western Africa. Graf discusses with reference to statements put forth by V. Hammer and Spiegel, the interpretation to be put on the 'D'Sulkarnein' or 'two-horned' of the 18th Surah of the Korân. He maintains with the best commentators on this work, that the allusion is to Alexander the Great. Some suggestive remarks follow, by Benfey, on the figures and names of divinities on Indo-Scythian coins, and on the interpretations given to them by Lassen. Dr. Roth translates passages from the Rig Veda which describe the ceremonies attending the burial of the dead in ancient India, and which show how opposed were the tendencies of the old Hindu ritual to the practice of Sutti, subsequently introduced by the Brâhmans. A paper by Blan on the modern history of Syria, and the continuation of one commenced some months back by Von Hammer on Saalchi conclude the No.

Among the correspondence, is a letter from Dr. Von Erdmaun of Novogorod on the question lately discussed by Dr. Sprenger and Professor Fleitcher regarding Muhammad's communications with the Monk Boheira during and subsequent to the prince's journey to Syria.

No. 2 of the *Journal* of the American Oriental Society opens with a translation, by Mr. Harrington of Ceylon, of the Siva-Pirakâsam, a metaphysical and theological treatise in Tamul, about two hundred years old. Then follow a notice, by Mr. Whitney, on the Vedic texts, a paper on the Talaing language, by Dr. Mason, and two others on the Karens, with a comparative vocabulary of their two dialects, the latter by Mr. Brown of Assam. A notice of Mr. Perkins's translation of a Syriac Life of Alexander the Great found in MSS. at Ooroomiah, but which proves to be nothing more than a Syriac version of Callisthenes, concludes the original contents of the No.



Among the correspondence is a highly interesting letter from Dr. Lobdell at Mosul, dated a year ago, but so full of promise for further discoveries, that we will give an extract from it.

“Nebbi Yunus is a little South of Koyunjik, but still remains almost intact, from the superstitious dread of the Mohammedans of disturbing the repose of Jonah, to the lofty *jam'eh* over whose tomb the Moslems go every Friday in great numbers from Mosûl, a mile distant, to pray. Helmy Pasha, the present governor of this district, did excavate somewhat in that mound last year, and found several large bulls and human giants, much injured by fire, and a few small antiques; among other things, a bronze lion on one side of which was an inscription which Col. Rawlinson reads: *Esarhaddon—the conqueror of Misraim and Cush*. Other inscriptions are said to assert that this mound of the prophet was built by captive women, and that of Koyunjik by men, from Babylonia.

“The Pasha's object in setting his manacled prisoners to work in a cellar, where one of the bull's heads was accidentally discovered, was to find gold, and he instructed his overseers to search carefully under the feet of the bulls for treasure! None appearing, he desisted; the inhabitants refused permission to the English and French to continue the explorations, and the antiquities of Nebbi Yunus are likely to be for some time yet undisclosed.

“A company has recently been formed in London for the purpose of excavating in the mounds of Lower Mesopotamia and Assyria, entirely independent of the British Museum, though it is expected they will work under the charter granted Mr. Layard and his patrons, which allows the removal to England of all objects discovered.


“The French are obliged to offer the Sultan one-half of all they find, and a late attempt of Mons. Place, the French Consul in Mosûl, to raft some fine bulls and winged human figures to Baghdad and Busrah, was opposed by the Pasha on the ground that he had not given the Cabinet of Antiquities lately opened in Constantinople, an opportunity to take the share due to the Turkish Government. These large slabs were drawn from Khorsabad, about twelve miles distant, on a cart built by the Consul expressly for the purpose in the strongest manner, the wheels being about twenty inches in dia-

meter, without spokes, by some three hundred Arabs for whom harnesses were made to order. The blocks now lie on the eastern side of the Tigris, under rude mud coverings which were built to prevent the sulphate of lime of which they were composed, from speedy decomposition. Sandstone was sometimes used for bulls in Nimroud, but gypsum was the common material, and this soft marble is susceptible of being most delicately wrought. It is easily worn by water, and even the rains of this hot climate are sufficient to decompose it very rapidly. It is only the immense mass of earth above the Assyrian sculptures which has preserved them from age to age.

“It is presumed that permission will be given to Mons. Place to remove the sculptures, which are destined for the Louvre, as application has been made to the French ambassador at the Porte, who is now in quite as good standing at Constantinople as Lord Stratford, and in fact wields almost as much power as the Sultan himself.

“Mr. Loftus, who was recently attached to the Commission appointed to run the boundary-line between Turkey and Persia, as geologist, passed through Mosûl a few days since on his way to Baghdad, in charge of the expedition fitted out by the newly formed English company. He expects about £20,000 to be placed at his disposal, and, with the advice of Col. Rawlinson, he will first lay open some of the sarcophagi in the great series of mounds at *Werka*—by some supposed to be the Ur of the Chaldees—and then explore various other *tels* in Mesopotamia. Should nothing of great interest be found there (you know that but few sculptures have ever been discovered in Babylonia, as gypsum-quarries are wanting there), he will come northward and continue the excavations so auspiciously begun by Layard and vigorously prosecuted by Rawlinson. The latter was just about to cease operations for the British Museum, and to send home the artist, when a discovery was made which promises to be not inferior to any made by Layard. The Colonel has not till recently had great success in excavating: a few slabs were found at Nimroud, some bricks, and ivory and copper utensils, with one or two basalt obelisks, well broken in pieces; and some large earthen cylinders, said to be of considerable interest, as at least one hundred years older than the sculptures of Nimroud, belonging to the time of Tiglath Pileser, turned up at Kalah Sherghat. Small

books—blocks of a light coloured clay, finely written over with arrow-heads—have been found in considerable numbers at Koyunjik, enough, indeed, to form quite a library, with vases, scarabei, cylinders and seals; but it was not till last week that anything of special interest was exhumed. I shall presume that you will be glad of a detailed account of so much of the new palace as has been laid open, since Rawlinson will not publish anything on the subject for some time to come. It will give me pleasure to communicate to you the result of further excavations, which, it is presumed, will now be prosecuted with considerable vigour, instead of being brought to a speedy close, as was anticipated.”



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,

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FOR OCTOBER, 1854.

At a meeting of the Society held on the 11th instant, at half-past 8 P. M.

Bábu RÁMGOPÁL GHOSE, Vice-President, in the Chair.

The minutes of the last month were read and confirmed.

Presentations were received—

1. From the Government of Bombay through Lt. Fergusson in charge of the Magnetical Observatory at Bombay, Magnetical and Meteorological Observations for 1851.

2. From F. E. Hall, Esq. Benares, a MS. of the *Tarikhé Rahimi*. With reference to the work Mr. Hall states: "The copy is a very old one; in fact I have grounds for believing it to be an autograph. \* \* \* Dilapidated as it is, it is highly probable that it may be thought worth being consulted by another Elliot, if India ever produces a man of kindred tastes."

3. From Professor Oldham, Geological Surveyor, specimens both geological and palæontological from Assam, Tavoy, Tenasserim, Beerbhoom, and the Rajmahal and the Khasia Hills.

4. From the Government of Bengal through Mr. Under-Secretary Young, specimens of Iron Ore from Upper Assam, collected by Capt. Hannay.

5. From the Government of India through Mr. Secretary Allen, specimens of Smelted Iron and Iron Ores from Ramghur, Kumaon, forwarded by Lt.-Col. H. Drummond.

6. From C. Trevor, Esq. on behalf of Capt. Porter, 10 Burmese MSS.

7. From Lt. Chase, a Hand-book of the Burman language.

8. From H. Stainforth, Esq. C. S. through Capt. Thuillier, Ancient Hindu Sculptures from the ruins of Gour.



W. Muir, Esq. C. S. duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

The following names were announced for ballot at the next meeting.

G. A. Bushby, Esq. C. S.,—proposed (for re-election) by C. Allen, Esq. seconded by Mr. Grote.

F. A. Lushington, Esq. C. S.,—proposed (for re-election) by A. Grote, and seconded by Bábu Rámghopál Ghose.

Lt. Nicolai W. Elphinstone, 4th Regt. N. I. Assistant Commissioner in the Punjab,—proposed by Lt. Lees and seconded by Capt. James.

Lt. H. S. Bivar, Jun. Assistant Commissioner in charge of Northern Cachar,—proposed by Capt. Dalton and seconded by Mr. Grote.

T. Boycott, Esq. Bombay Medical Service, Assay Master, Calcutta Mint,—proposed by Dr. Falconer, and seconded by Mr. Allen.

Communications were received—

1. From Bábu Radhánath Sikdar, enclosing Abstracts of meteorological observations taken at the Surveyor General's Office, Calcutta, during the months of June and July.

2. From C. P. Carmichael, Esq. Assistant Secretary to the Government of the N. W. Provinces, forwarding Meteorological Observations kept at the Secretariat Office at Agra, for the month of August, 1854.

3. From W. Theobald, Esq. submitting the following papers:

1.—On the Geology of the Salt Range.

2.—Notes on the Nidification of some of the commoner birds of the Salt Range with a few additional from Kashmir.

4. From the Government of Bengal through Mr. Under-Secretary Young, communicating a paper entitled "Notes on the languages spoken by the Mishmis," by W. Robinson, Esq.

5. From Bábu Rájendralál Mittra, submitting notes "on the Peculiarities of the Gáthá dialect."

6. From Capt. Dalton, Debrughur, enclosing a paper, by Mr. W. Robinson, "On the ancient history of Assam."

7. From Dr. Campbell, Darjiling, forwarding some "Notes on Eastern Thibet."

8. From Mr. Blyth, submitting a "Memoir on the Indian species of Shrews,"

The Librarian and the Curator in the Zoological department submitted their usual monthly reports.

J. W. COLVILLE, *President*.

*Confirmed 3rd Nov., 1854.*

*Report of Curator, Zoological Department, for September, 1854.*

During the last few days, the Society's Museum has been enriched with numerous specimens of interest.

1. In a box addressed to the Secretary, and marked Moultan, care of Babu Ananda Chandra Basu, Sub-Assistant Surgeon,\* have been sent a bottle of *petroleum*, which has been made over to the Geological department, and the skin of a small Fox, with skull and several other bones of another individual of the same species.

This little Fox pertains to a species hitherto undescribed and merely vaguely indicated, which I have long sought to verify. The Hon'ble Mountstuart Elphinstone remarks, of the Foxes of the great Hurriána desert, that these "are less than our [the English] Fox, but somewhat larger than the common one of India: their backs are of the same brownish colour with the latter; but in one part of the desert, their legs and belly up to a certain height, are black, and in another, white. The line between those colours and the brown is so distinctly marked, that the one kind seems as if it had been wading up to the belly in ink, and the other in white-wash." (*Account of Cabul*, &c. p. 7.) Mr. Walter Elliot would not appear to have discriminated this small Fox of W. India from V. *BENGALENSIS*; further than by the observation, that—"It is remarkable that though the brush is generally tipped with black, a white one is occasionally found; while in other parts of India, as in Cutch, the tip is always white." (*Madr. Journ.* X, 102.) We have little doubt that Mr. Elliot's supposed variety of V. *BENGALENSIS* with white-tipped tail, refers to the present species: but Mr. Griffith's smaller Fox of Afghanistan (*J. A. S.* X, 978,) is different; and so we now consider Mr. Theobald's small Fox of the Punjab salt range (*J. A. S.* XXII, 581,) to be, and this may bear the appellation V. *PUSILLUS*. The small desert Fox of W. India may be designated

V. *LEUCOPUS*, nobis. It is a typical *VULPES*, which V. *BENGALENSIS* is not; of the size of *BENGALENSIS*, or smaller than *PUSILLUS*. The specimen under examination is an adult female: general colour pale; the

\* This box was delivered at the Museum by a servant, who stated that his employer had died on the journey down, and that he had accordingly taken charge of his late master's property, including the box here noticed.

cheeks, sides of neck and of body, and the inner side and most of the fore-part of the limbs, white; with a few blackish tips intermixed on the sides of the body, though insufficient to affect the white appearance at a little distance: shoulder and haunch, with most of the outside of the limbs nearly to the mid-joint, a mixed black and white, with the under-fur whitish-isabelline: on the face, middle of back, upper-part of tail, and hind-part of the outer side of the fore-limbs, a light fulvous hue prevails, slightly mingled with black and white upon the back, where the under-fur is pale slaty: tail mostly pale, except towards the base above, and largely tipped with white: lower parts pale nigrescent (in old males probably much darker, with increased admixture of black upon the limbs; so that, upon inspection of this specimen, it is easy to comprehend the varieties of colour mentioned by Elphinstone): ears black posteriorly; and larger than in *V. BENGALENSIS*: the fur soft and fine, as in *V. MONTANUS* and *V. PUSILLUS*; altogether dissimilar from that of *V. BENGALENSIS*. The skull, as compared with that of *BENGALENSIS*, has the muzzle distinctly narrower; and the lower jaw is weaker, with much narrower coronal process. We have vainly tried to identify this Fox with any named species.\*

\* The following is the series of Indian and Tibetan Foxes now in the Museum of the Society.

1. *V. NIPALENSIS* (et *flavescens*), Gray: *V. montanus* apud Hodgson, *passim*. Described in *J. A. S.* XI, 589. The common large Fox of Tibet, rarer S. of the snows, and believed by Mr. Hodgson to be *V. MONTANUS* until we shewed him the identical specimen upon which the latter was founded by the late Mr. Pearson. In Dr. Gray's printed catalogue of the specimens presented by Mr. Hodgson to the British Museum, *V. montanus* apud Hodgson is identified with *V. FLAVESCENS*, Gray; but it differs much from the small Afghanistan Fox which we have hitherto referred to *V. FLAVESCENS* (vide *J. A. S.* XIV, 314). This handsome species is of the size of *V. VULGARIS* and *V. MONTANUS*, but has much finer, longer, and denser fur, of a prevailing bright light yellowish-fulvous colour, with correspondingly superb brush, and the black ears strongly contrasting. The Society's specimens are from beyond the snows.

2. *V. MONTANUS*, Pearson: *V. himalaicus*, Ogilby. Like the British *V. VULGARIS*, but always much less rufous, paler and more hoary; specimens varying, however, a good deal in colour. Common in the N. W. Himalaya, as about Simla and Masuri; and the larger Fox of Afghanistan was thought to be identical with it by the late Mr. Griffith.

3. *V. PUSILLUS*, nobis. The small Fox of the Punjab Salt Range. Nearly resembles the last, except in being a much smaller animal.

4. *V. GRIFFITHII*, nobis, *n. s.* The ordinary small Fox of Afghanistan (vide



2. Capt. Berdmore, Schwe Gye, Pegu. Skin of a small Flying Squirrel new to the museum, and apparently identical with the Javanese *SCIUROPTERA SAGITTA*, (Lin.).\* Also some Bats in spirit,—*NYCTICEJUS LUTEUS* and *N. TEMMINCKII*, and three specimens of *VESPERTILIO ADVERSUS*, Horsfield. Skin of *POLYPLECTRON CHINQUIS*, Tem.: and various reptiles and some insects in spirit. Among the former is a nearly adult example, and three young, of *LEIOLEPIS REEVESII*, Gray;† one of *XENOPELTIS CONCOLOR*; a small *DIPSAS MULTIMACULATA*; *RANA VITTI-GERA*, Weigmann;‡ *HYLÆDACTYLUS BIVITTATUS*, Cantor; *ENGYSTOMA* (?) *INTERLINEATUM*, n. s.; *E. CARNATICUM*, Jerdon; and *BUFO MELANOSTICTUS*.§ The insects are chiefly *Coleoptera*.

*J. A. S.* XIV, 344). Size of last, or larger than *V. LEUCOPUS*, with longer fur, and the pale parts tinged with yellowish-fulvescent.

5. *V. LEUCOPUS*, nobis, *supra*. The small desert Fox of W. India.

6. *V. BENGALENSIS*, (Shaw): *Canis kokree*, Sykes: *C. rufescens*, *V. chrysurus*, et *V. xanthurus*, Gray: *V. corsac* apud Ogilby. India generally, but not Ceylon.

7. *V. FERRILATUS*, Hodgson. Tibet. *N. B.* Lt. Speke, of the 46th N. I., informs us that he is familiar with three species of Foxes in Tibet; two of which he identified in our museum with Nos. 1 and 7, and the third he stated to be more like No. 6;—doubtless, therefore, the true *CORSAC* of Pallas, which according to Dr. J. E. Gray “is very similar to *V. BENGALENSIS*, but differs in having no grey collar round the front of the chest.”

\* It is nearly affined to *Sc. SPADICEUS*, nobis (*J. A. S.* XVI, 867), from Arakan; but is larger, with the upper-parts much less rufous. Length about 6 in.; and the tail 5 in.: tarse with claws,  $1\frac{3}{8}$  in.

† “This beautiful Lizard,” writes Capt. Berdmore, “called by the Burmese *Padat*, is by no means uncommon. It burrows in sand; and the Burmese eat it.”

‡ *Act. Acad. Leopold.* Vol. XVII, pt. 1, p. 255, and t. XXI, f. 1, (1835); from Philippines and China: identical with *R. assimilis*, nobis, *J. A. S.* XXI, 355, from Bengal, Arakan, and Pegu.—*R. RUGULOSA*, Weigmann, *ibid.* p. 258 and t. XXI, f. 2, is identical with *R. bengalensis*, Gray, apud nos, *ibid.*

§ The *HYLÆDACTYLUS BIVITTATUS*, Cantor, *J. A. S.* XVI, 1064, appears to be subject to considerable variation in its colours and markings. Dr. Cantor describes the mature male, An adult female measures—Head and body, 2 in.; hind-limb the same, of which the foot (to end of longest toe) is half; fore-limb,  $1\frac{3}{8}$  in. Form tumid, inelegant: the back much arched. Skin thick and leathery; above smooth, below minutely corrugated. Colour (in spirit) deep reddish-brown, clouded above with dark olive-brown, margined with black. A large dorsal patch is first conspicuously visible at the occiput, where narrow, widening much over the back; besides its black edge, this is mottled with a few scattered black spots. An irregular blackish line passes backward from each eye: and the hind-limbs are



3. Capt. S. R. Tickell, Maulmein. Various bird-skins, including *CRYSIRINA VARIANS*; *GARRULAX CHINENSIS* (shot about 100 miles south of Maulmein, associating with the common *G. BELANGERI* of the Tenasserim Provinces); *EMBERIZA AUREOLA*, Pallas (of which *Euspiza flavogularis*, nobis, *J. A. S. XVIII*, 811, proves to be the same bird when not in its nuptial livery); and *GALLOPHASIS LINEATUS*.

4. Capt. Fletcher Hayes, Lucknow. Skull of *VULTUR MONACHUS*.

5. Mr. R. Spears. An enormous tree-fungus, which was picked up floating in the Brahmaputra, and is considered by Dr. Falconer to be an undescribed species of *POLYPORUS*, which he designates *P. MELADERMA*.\*

6. Dr. E. F. Kelaart, Galle. Various reptiles, and a fine collection of Cinghalese insects, sent in spirit.

7. W. Theobald, Esq. Junr. A considerable number of specimens in

banded more or less obscurely, the reddish-brown ground-hue becoming paler and brighter on the thighs posteriorly, where mottled and spotted with black. Hab. Pegu, Mergui, and the Malayan peninsula.

*ENGYSTOMA* (?) *INTERLINEATUM*. *n. s.* Hind-feet more webbed than in typical *ENGYSTOMA*: the belly and under surface of the thighs tuberculated; with also a few larger warts on the thoracic region. Length of head and body,  $1\frac{1}{2}$  in.; of hind-limb,  $1\frac{3}{4}$  in. Colour, a golden clay-brown above, with medial blackish vertical streak, diverging into two at the nape, which are continued to the base of each hind-leg, and when the hind-leg is closed, it appears to be continued on to the limb. Anteriorly to the eyes, a narrower branch passes over the orbit and is also continued to the base of the hind-limb; and a median duller line appears on the croup, which abruptly diverges widely towards the vent. Narrower intermediate lines are also traceable; and the principal streaks are set off by a pale golden edge. Limbs beautifully banded; the tarse dusky posteriorly. Throat and breast blackish; the tuberculated belly and thighs tinged with yellow. Sides black, continued in a straight line from the nostrils and eye, and strongly contrasting with a bright pale golden edge above. Hab. Pegu.

*E. CARNATICUM* is identified from a drawing sent by Mr. Jerdon, and the same species was procured by Capt. R. Tytler (38th N. I.) at Dacca, and by Mr. Theobald in Birbhúm.

\* "*POLYPORUS*. *Sect. Apus*, (*Fries, Syst.*, p. 359).

"*P. MELADERMA*, *Durus*, *pileo dilatato inaequabiliatrató, margine porisque canescentibus*.

"The size is remarkable; although not unprecedented. *P. SQUAMOSUS* has been met with in Scotland with a circumference of 7 feet 5 inches, and weighing 34lb avoirdupois; and *P. FRAXINEUS* has been met with in England measuring the enormous size of 42 inches across: the same dimensions in the Asám species being 35 inches. I have made a detailed description of it."—*H. F.*

various classes, of species either quite new to the museum, or hitherto imperfectly represented in our collections.

Among the mammalia, is a fine skin of the Indian Wolf, *CANIS PALLIPES*, Sykes: \* some good Bats in spirit; comprising *RHINOLOPHUS MINOR* (?), Horsfield (v. *lepidus*, nobis, *passim*, vide *J. A. S.* XXI, 347); *HIPPOSIDEROS CINERACEUS*, nobis, *J. A. S.* XXII, 410; *MYOTIS PALLIDIVENTRIS*, (Hodgson), vide *J. A. S.* XXII, 581), from Kashmir; *LASIURUS PEARSONI*, Horsfield (*Vesp. lasyura*, Hodgson), from the vicinity of Darjiling; and others: skull of *ERINACEUS COLLARIS*, Gray (vide *J. A. S.* XXII, 582). † Specimen of *SORICULUS NIGRESCENS*, (Gray, v. *Sorex sikimensis*, Hodgson): ‡ *GERBILLUS INDICUS*, from Monghyr; *MUS GERBILLINUS*, nobis, *J. A. S.* XXII, 410 (to which *M. Theobaldi*, nobis, XXII, 583, must be referred as a synonyme); *M. OLERACEUS*, Sykes (or a nearly affined species, perhaps *M. DUMETICOLA*, Hodgson, if not also *M. PUVENSIS*, Hodgson, *Ann. Mag. N. H.*, XV, 268-9,—merely differing from *M. OLERACEUS* of S. India and also of Asám by having the upper-parts less brightly coloured,—length of male  $3\frac{1}{8}$  in.; tail  $4\frac{3}{8}$  in.; *planta*  $\frac{3}{4}$  in.);

\* The Society's museum now contains good and characteristic examples of the skulls of the European, Indian, and Tibetan Wolves (*CANIS LUPUS*, L., *C. PALLIPS*, Sykes, and *CANIS-Lupus-LANIGER*, Hodgson); and the specific distinctions appear to be well marked. The European is the largest of the three, with proportionally much larger and more powerful teeth, and the orbital process of the frontal bone is much less developed than in the others, as likewise the lamdoidal and sagittal crests. The Indian and Tibetan are more nearly affined than either is to the European.

† The *E. MICROPUS*, nobis, *l. c.*, has since been designated *E. nudiventer* by Dr. Horsfield, in his catalogue of the specimens of mammalia in the India-house museum (1851).

‡ This species was long ago sent from Nepal, by Mr. Hodgson, to the museum of this Society, and also (it would appear) to the British Museum, by the name *SOREX SOCCATUS*; which Dr. Gray consequently cites as a synonyme: and as another synonyme he correctly gives *S. aterrimus*, mentioned *J. A. S.* XII, 128: but Mr. Hodgson has since described a very different species, appertaining to a different group of Shrews, by the name *S. SOCCATUS*, and to which it is more intelligibly applicable. Of his specimen sent to this museum by that name, and also of the identical specimen on which we had previously bestowed the *M. S.* name *aterrimus*, we still possess the skulls. The dentition is that of *CROSSOPUS*, and not of *CORSIRA* (to which group Dr. Gray assigns the species); but this common little Sikim Shrew does not exhibit the modifications for aquatic habits which are characteristic of *CROSSOPUS*, Wagler.

from Monghyr district; and *M. SPINULOSUS*, *n. s.*,\* from the Punjab: heads, and a skin of the female, of *OVIS VIGNEI* (mistaken for the very different *O. MONTANA*, Geoff., in Major A. Cunningham's 'Ladak');† and horns for exhibition to the meeting of the *Honglu* or Stag of Kashmir, and of the *Shou* or Tibetan Stag.

Of the former, are one loose pair, and three odd horns; and we have also the pleasure to exhibit a fine frontlet of the same species, sent for exhibition to the meeting by Major A. Broome; and the noble frontlet of *C. CANADENSIS* figured in *J. A. S. XXII*, No. 7.

A glance suffices to shew that the three are distinct species: the Kashmirian being a smaller Stag than the Tibetan, and more nearly affined to the British Red Deer, or *C. ELAPHUS*: bearing horns of a size to suit the Persian *Maral*, which we saw alive in London, and which is most probably the same animal. Indeed, from the series under inspection, it may fairly be inferred that some horns of the adult Kashmirian Stag would be undistinguishable from some horns of the European Stag: though, generally, the Kashmirian are larger, with less ramifying crown; but scarcely larger than some from the German forests,‡ and especially than European fossil specimens, considered without doubt to belong to *ELAPHUS*: these large European specimens, however, have much finer crowns than hitherto appear to have been met with in the Stag of Kashmir. In all, even the finest, horns of the Tibetan Stag hitherto obtained, the crown consists of a simple bifurcation, exhibiting no tendency to ramify further. In those of five individuals of the Kashmirian Stag under review, the crowns of three trifurcate, but without shewing a tendency to further subdivision; and the beam is less abruptly bent at the origin of the median or royal antler, than in the Tibetan *Shou*.§ In Major Broome's

\* *MUS SPINULOSUS*, nobis. Nearly affined to *M. PLATYTHRIX*, Sykes; but of a dark dusky colour above, with fulvous tips to the softer fur: below, and all the feet, whitish. Upper rodential tusks orange, the lower white. Whiskers long and fine, the posterior and longer of them black for the basal half or more, the rest white. Length of adult male (in spirit),  $3\frac{3}{4}$  in.; tail 3 in. (about, the extreme tip wanting in the specimen); planta,  $\frac{7}{8}$  in.

† *O. MONTANA* is the N. American representative of *O. AMMON*; of the same size, but with still more massive horns, bulging more between the angles; also with much black on the front of the neck, where *O. AMMON* is white.

‡ *Vide* description of a pair, in *J. A. S. X*, 749.

§ *Vide* Major Cunningham's representation of simply bifurcating horns of the Kashmir Stag, 'Ladak,' &c. pl. VII. Also figs. 8 and 9 of plate to *J. A. S. X*, 750. And compare these with Mr. Hodgson's highly characteristic figure of the



specimen of the Kashmirian Stag, the prongs of the trifurcate crown are remarkably elongated, the crown subdividing low: and this pair has very much the character of a fine pair of Red Deer horns, and might well pass as such among connoisseurs familiar with the latter. In one of Mr. Theobald's specimens, there is considerable flattening at the crown; and in another, with bifurcate summit, the posterior prong is elongated and much flattened. Lt. Speke, of the 46th N. I., who has himself shot many Kashmir Stags, was astonished at the size of the *C. CANADENSIS* frontlet and horns before the meeting, which he declared were out of all proportion too large for any *Honglu*; but Mr. Hodgson's largest *Shou* horns would appear to equal those of the *Wapiti*; and the Tibetan animal certainly approaches the N. American in size and general character, while the Kashmirian more approximates the European. It will probably be found, however, that the bez-antler is of more regular and constant occurrence in the Kashmirian than in the European Stag; for it is frequently wanting in good-sized specimens of the latter, as it constantly is in those of *C. BARBARUS* of the Atlas range, wherein the crown commonly bifurcates and sometimes trifurcates. The Kashmirian Stag, recognised as a distinct species, and if identical with the Persian *Maral* (as there is every reason to suppose), will stand as *C. CASPIANUS*, Falconer, apud Gray; and if distinct from the *Maral*, as *C. CASHMEREIENSIS*, Falconer, apud Gray.\*

horns of the Tibetan Stag, in *J. A. S. X*, 722, pl. ; where designated *CERVUS AFFINIS*.—Since writing this, we have had figures taken of all the Kashmirian horns exhibited to the meeting, *vide* pl.

\* *List of Osteological specimens in the British Museum*, pp. 65, 147 (1847). In his subsequently published 'Synopsis of the species of Deer' (*Ann. Mag. N. H.*, 2nd series, IX, 419), Dr. J. E. Gray identifies the Persian *Maral* and Kashmirian *Honglu*, but applies to them the name *C. PYGARGUS*, Hardwicke, with *C. Wallichii* as a synonyme, under the mistaken supposition that the Tibetan *Shou* has not the white caudal disk. This nomenclature cannot be conceded. The name *PYGARGUS* was never bestowed by Gen. Hardwicke; but he erroneously identified his Tibetan Stag with *C. PYGARGUS*, Pallas, or the Siberian Roe; a widely different animal. *Vide Trans. Lin. Soc.* XIV, 581. It does not appear that Gen. Hardwicke's paper on this animal was even published; but a brief abstract of it is given *l. c.*, stating it to be "a native of the snowy mountains and plains of Muktinauth, about five weeks journey from the valley of Nepal, in a north-west direction.\* The subject examined was a full grown male, 7 ft. 8 in.

\* Muktinauth is not far from the famous Dwalgiri; but on the opposite or eastern side of the Gunduk river, and lies to the north of the great Himalayan range. *Vide* Allen's Map of India.



The only fragments of a bird-skin worthy of notice are the wing and leg of an undescribed species of Gallinule, from the Punjab Salt Range: apparently and doubtless the same as one which we could never identify, as represented in two coloured figures among the drawings of the late Sir A. Burnes, who obtained his specimens in Kabul. He terms it "*Kushkul*: 1 ft. long; 2 ft. from tip to tip." The species seems intermediate to the common *GALLINULA CHLOROPUS* and *PORZANA AKOOL*, (Sykes); and like the latter has no white under the tail, while it agrees with the common Gallinule in the colouring of the head and neck. The specimen of a closed wing presented by Mr. Theobald measures  $6\frac{3}{8}$  in. in length, and is remarkable for having the outer web of the first primary wholly white, as also a broad white border to the outermost and largest feather of the winglet; while the coverts are of a dark slaty ash-colour, instead of being olivaceous (as in both the species cited.) The tarse measures  $2\frac{1}{8}$  in.; middle toe and claw  $2\frac{5}{8}$  in., the latter but  $\frac{7}{16}$  in.; all the claws being much shorter, finer, and of a paler colour, than in many specimens examined of *G. CHLOROPUS*. Burnes's figures represent a *GALLINULA*, rather than a *PORZANA*; with pale crimson irides, and legs and feet apparently of

in length from the tip of the upper lip to the extremity of the very short tail, and 4 ft. 3 in. in height." A more detailed description exists among the Hardwicke MSS. in the British Museum, from which we derived the brief notice and measurements published in *J. A. S. X*, 745, which differ somewhat from the preceding: \* and accordingly Mr. Hodgson is mistaken in supposing (*J. A. S. XX*, 593), that the name *WALLICHII* rests solely upon the authority of a native drawing, a copy of which was published by F. Cuvier.

According to Dr. Gray, "the skull of Dr. Falconer's Kashmir Stag is 15 in. long; the suborbital pit is oblong, triangular, and rather deep. The skull and horns are very like to Mr. Hodgson's specimen of *C. AFFINIS* (*WALLICHII*), but they are considerably smaller.

"Sir John McNeill informs us," he continues, "that they are called by the Persians *Maral*, or *Geoge*, or *Gookoohee*, and the species is frequently noticed in their literature. It is found in all the wooded mountain districts of Persia, but apparently does not occur in the central parts of that country. They rarely descend into the plains. During the summer they are found in the highest wooded parts of the mountains; and during the winter in the lower ravines, near their bases, where they are frequently tracked in the snow. The horns of the adult males closely resemble those of the adult males of the British Red Deer; insomuch that I doubt whether an unscientific observer could distinguish them, except by the superior size of those of the *Maral*."

\* Compare both with those of the *Wapiti*, taken also from the living animal, in *J. A. S. X*, 738.

the same colour as in the common Gallinule, the orange *garter*, however, less developed. Beak also coloured as in *G. CHLOROPUS*, but much more slender; and if the colouring can be relied upon, the red passes further along the upper mandible, and the yellow further back upon the lower mandible, while the frontal shield is small. There is also no representation in either figure of the white markings of the flanks conspicuous in the common Gallinule, and which the artist could scarcely fail to have represented, had they existed in the specimens before him. Convinced, therefore, that a peculiar and distinct species is represented, we shall provisionally name it *GALLINULA BURNESII*.

Mr. Theobald has also presented nests of *ORIOLOUS KUNDUO*, *LANIUS HARDWICKII*, and *MUNIA MALABARICA*: of which last species he observed the curious fact of two pairs of birds constructing a single ordinary nest in common, within a few yards of his tent, where he was encamped for several months continuously; and from another nest of the same species he took the extraordinary number of 25 eggs!\* We are further indebted to him for eggs of the following species of birds:—*BUTEO CANESCENS* (*EUFINUS*?) ; *POLIOENIS TISA* ; *HALIAËTUS MACEI*, *NEOPHRON PERCNOTERUS* ; *OXYLOPHUS MELANOLEUCOS* ; *CENTROPUS RUFIPENNIS* ; *CORVUS CORAX* (from Punjab Salt Range); † *C. ———*? (Kashmir hills); *C. MONEDULA* (Kashmir); *ACRIDOTHERES TRISTIS* ; *MUNIA MALABARICA* ; *GALE RIDA CRISTATA* ; *MALACOCERCUS CAUDATUS* ; *LANIUS LAHTORA* ; *L. TEPHRONOTUS* ; *L. HARDWICKII* ; *THAMNOBIA CAMBAIENSIS* ; *PYCNONOTUS CAFER*? (*bengalensis*) ; *P. HÆMOERHOUS* ; *P. LEUCOTIS* ; *NECTARINIA ASIATICA* ; *TURTUR HUMILIS* ; *AMMOPERDIX BONHAMI* ; *CACCABIS CHUKAR* ; *PERDIX PONTICERIANA* ; *TURNIX OCELLATUS* ; *SARCIOPHORUS BILOBUS* ; *HERODIAS BUBULCUS* ; *ARDEOLA LEUCOPTERA* ; *GALLINULA CHLOROPUS* (*BURNESII*?) ; *FULICA ATEA* (Kashmir); *DERDROCYGNA AWSUREE* ; *NETTAPUS COROMANDELIANUS* ; *PODICEPS CRISTATUS* (Kashmir); *P. PHILIPPENSIS* ; and a few others, undetermined.

Of reptiles, Mr. Theobald has favored us with specimens of *CYRTODACTYLUS MACULARIUS*, *n. s.*, from the Punjab Salt Range; *GYMNODACTYLUS GECKOIDES* (*vide J. A. S. XXII*, 410), from ditto; *HEMIDACTYLUS LESCHENAUThII*, D. and B., from ditto; *STELLIO CYANOASTER*, *Ruppell* (*vide J. A. S. XXII*, 646), from Kashmir; *LAUDAKIA* (?) *MELANURA*, *n. s.*, Kashmir (?) ; *CHARASIA DOBSALIS*, Gray, from Birbhum; *AGAMA*

\* According to Col. Sykes, this species (his *Lonchura cheet*) sometimes takes possession of the deserted nests of *PLOCEUS PHILIPPINUS* (or more probably of *PL. MANYAR*). *Proc. Zool. Soc.* 1832, p. 95.

† *Vide* p. 218, *ante*.

AGILIS, Olivier (*Trapelus flavimaculatus*, Ruppell, or a most closely affined species), from the Punjab Salt Range; CALOTES TRICARINATUS, (*J. A. S. XXII*, 652), Darjiling;\* ACANTHODACTYLUS VULGARIS, Dumeril and Bibron, Punjab Salt Range;† MOCOA SIKIMMENSIS (*J. A. S. XXII*, 652), Kashmir (!); EURYLEPIS TENIOLATUS, *n. s. et g.*, Punjab Salt Range; TORTRIX ERYX (*Eryx indica*, Gray), ditto; CALAMARIA FUSCA (*J. A. S. XXIII*, 288), Darjiling; CORONELLA CALLICEPHALUS, Gray (*XXIII*, 289), ditto; COLUBER VITTACAUDATUS, *n. s.*, ditto; TROPIDONOTUS DIPSAS, var.‡ (*J. A. S. XXIII*, 297), ditto; and VIPERA ECHIS, *Ind. var.* (remarkably fine), from the Punjab Salt Range.§

\* Several specimens are all of the same small size as the example originally described.

† Figured by Savigny, *Rept. d'Egypt, Supp.* pl. 1, f. 9.—*N. B.* The *AC. NILGHERRIENSIS*, Jerdon, *J. A. S. XXII*, 476, is an *EREMIAS*, Fitzinger.

‡ Almost plain blackish above, buffy-white below, with a lateral row of black spots,—one near the margin of each abdominal scuta, beginning from about a fourth of the entire length; a whitish V-like mark behind the occiput.

§ *CYRTODACTYLUS MACULARIUS*, nobis, *n. s.* Apparently affined to *C. MAR. MORATUS*, (Kuhl), of the Malay countries; with tail granular beneath, as in that species: scales on throat minute, becoming gradually larger to the abdomen. The very young have probably the crown black; a broad black band across the nape; two others upon the body, between the fore and hind-limbs; another where the hind-limbs are articulated; and three more upon the tail, besides its black tip: the inter-spaces being of a fine rosy-carneous hue, with a few black tubercles interspersed among the numerous pale tubercles: limbs and under-parts spotless, on the former slightly marked. In a specimen not half-grown, the interior of the black bands is pale and speckled with black, the margins continuing black; and it is probable that the dark hue ultimately disappears from the interior of the patches. In the specimen under examination, the dark hue appears to have almost left the crown, its blackish margin only remaining, as a streak from the nostril through the eye and continued round to join its opposite upon the occiput: crown and cheeks mottled with dark spots more or less confluent; and the interspace from the occiput to the nape-band has many black tubercles. The length of this young specimen (which had lost and renewed its tail-tip) is  $3\frac{1}{2}$  in. from snout to vent: but Mr. Theobald informs us that the species attains more than double the size, and when alive is remarkable for the beauty of its prevailing rosy-carneous hue. It probably attains the size of *C. PULCHELLUS*. From the Punjab Salt Range.

*LAUDAKIA* (?) *MELANURA*, nobis, *n. s.* A well marked second species of Dr. Gray's genus *LAUDAKIA*, founded on the *AGAMA TUBERCULATA* of Hardwicke's *Ill. Ind. Zool.*; if not, rather, a new genus affined to *LAUDAKIA* (in which case this may bear the name *PLOCEDERMA*, nobis). Head and body flat, or depressed: the tail more than twice the length of the head and body; and slender, except towards its base, where depressed and broad. Longest fore-toe reaching to the vent: longest hind-toe to the eye. Tympana large and round; their circum-



The occurrence of certain of these reptiles in Kashmir and upon the Punjab Salt Range is highly interesting; as especially *GYMNODACTYLUS*

ference partly concealed by surrounding tuberculated plaits or folds. A glandulous pit above the shoulder, black within; and thence a small plait is continued back over the shoulder to the flank, where followed by another and smaller one; there is also a lateral fold or plait from fore to hind-limb, margining the abdominal surface. Two transverse folds on the throat; the anterior of which is a double or cross-fold: continued upward into a complication of sundry folds or plaits on the sides of the neck, and there are others above the axilla. A slight appearance of crest on the nape only. Head covered with smooth round or hexagonal scales, in general convex, flat upon the orbits, and obtusely keeled transversely upon the snout. Scales of the back imbricated, keeled; largest along the middle, and gradually smaller to the sides, where minute: those upon the tumid base of the tail very large, with prominent keels terminating each in a raised point; save on the under surface, where they are pointed but not keeled: the long slender portion of the tail is clad with similar but small scales: those on the upper and posterior surface of the limbs are keeled, with acute points, like those of the tail: and those of the lower-parts are small, hexagonal, and smooth. On the abdominal region is a patch of rather larger and glandulous scales, much less developed than in *L. TUBERCULATA*, and placed much lower down (nearer the hind-limbs) than in Hardwicke's published figure of that species: another and præ-anal patch of the same, not very distinct; but the vent is bordered with a ridge of minute scales anteriorly, and posteriorly with a crescent-like patch of the same, beyond which is a remarkable depression like a false vent. On the folds about the tympana, sides of the neck, and axillæ, also on some transverse folds upon the base of the hind-limbs posteriorly, and one above the base of the hind-limb on its dorsal aspect, are some rather larger and tubercular scales: but not any of these are interspersed over the body, as in *L. TUBERCULATA*. Colour (in spirit) olive-grey; probably olive-green and changeable when alive; the head and body speckled over with dark scales, and also with some scales paler than the rest: the long slender portion of the tail dusky black: and the lower-parts pale or buffy white, apparently suffused with crimson when alive; the throat and below the shoulders beautifully marbled with greyish-black, probably blue in the living animal. Entire length of specimen 11 in.; of which tail  $7\frac{3}{4}$  in.: and hind-limb  $2\frac{5}{8}$  in. Habitat uncertain; but believed to be Kashmir.

*EURYLEPIS*, nobis, *n. g.* Affined to *THYRUS*, Gray (founded on the *GONGYLUS OCELLATUS*, D. and B.) Body fusiform, depressed; with rather small limbs, five-toed, the first and fifth toe of the hind-foot short and the fourth longest. Tail longer than the head and body, cylindrical and evenly tapering. Head pyramidal; the scutation as figured by Savigny of his *Anlois pavé* (*Descr. Egypt., Nat. Hist., Rept. t. 4, f. 4, v. Scincus multiseriatus*, Cuv., *R. A., et Sc. pavimentatus*, Is. Geoff.; but undescribed by M. M. Dumeril and Bibron, who doubtfully identify it with *EUPREPIS SEPTENTENIATUS*, Reuss,—*Hist. Rept. v, 682*). Nostrils lateral, pierced in a small separate nasal scuta. A translucent disk to the lower eye-lid. Tympana sunk: the auditory orifice serrated anteriorly. Palatal incision



GECKOIDES, STELLIO CYANIGASTER, AGAMA AGILIS, and ACANTHODACTYLUS VULGARIS. Mr. Theobald's shells consist chiefly of well known species, and include a fine series of the Afghan BULIMUS SPELÆUS, Hutton, from the Salt Range.

E. BLYTH.

rather large. Two great præ-anal scales, obliquely separated. All the scales quite smooth, without trace of keels. A remarkable character consists in a series of very wide (but longitudinally narrow) scales along the middle of the back, continued from above the articulation of the fore to that of the hind-limbs; beyond which either way they are represented by an alternately double series, hexagonal, and similar to the scales on the other parts. There are two lateral series of dorsal scales on either side of the broad medial series; three additional series on the sides of the body; and eight abdominal series: all longitudinal. Along the middle of the tail underneath is also a series of broad scales, and ten other longitudinal series surrounding the tail. The scales of the upper-parts are conspicuously distinct apart; those of the under-parts less so. Scales upon the limbs smaller than the rest, but otherwise similar. No femoral pores.

EU. TENIOLATUS, nobis, *n. s.* Pale olive-grey above, with three pale-spotted dark bands more or less distinct, reaching backward as far as the hind-limbs; and the tail more or less speckled with dusky-black: under-parts spotless dull-white. In the young, these markings are much more intensely brought out: the medial dorsal band is less broad than the series of wide medial dorsal scales along which it runs, and also than the lateral bands; and the tail is brightly spotted throughout, except along its under surface. Length of adult 9 in., of which the tail (from vent) is  $5\frac{1}{4}$  in.; fore-limb  $\frac{3}{4}$  in., reaching to the fore-part of the eye; and hind-limb, 1 in.: distance from fore to hind-limb  $2\frac{3}{8}$  in. This handsome Scink is common in the Alpine Punjab.

COLUBER VITTACAUDATUS, nobis, *n. s.* Affined to C. FASCIOLATUS, Shaw. Vertical plate pentagonal, with obtuse posterior apex. A single frænal. Nineteen rows of scales. Abdominal scutæ, 220: caudal scutellæ, 95 pairs. Ground-colour olive, paler below: a broad black streak behind each eye, not continued on to the neck, and hardly shewing anterior to the eye: rest of head and neck without markings. Tail short, with four longitudinal black bands on a whitish ground: anterior to the vent, the upper band on each side becomes much broader, and is crossed with numerous pale striæ, more or less distinct; which, at about the second posterior fifth of the entire length of the animal, coalesce and unite to form a lateral pale band, more or less broken and continued forward to the neck: above and below this irregular pale band, are series of black elongated diamond squares, pale-centred excepting those towards the neck; the upper series of these squares uniting, each with its opposite, leave a series of lengthened oval pale spots along the middle of the back, continued (from about the third-fifth of the length of the animal) as an unbroken pale-band to the end of the tail. Lower-parts pale, mottled with black, resolving into two dark lines upon a pale ground, along the posterior two-fifths of the entire length. Length of specimen, 19 in.; of which tail,  $3\frac{1}{2}$  in. From the vicinity of Darjiling.

## LIBRARY.

The following additions have been made to the library since September last.

*Presented.*

Magnetical and Meteorological Observations made at the Hon'ble East India Company's Observatory, Bombay, in the year 1851. Bombay, 1854, 4to.—BY THE RIGHT HON'BLE THE GOVERNOR IN COUNCIL OF BOMBAY.

Parabole de l'enfant Egaré formant le chapetre IV. du Lotus de la Bonne Loi, Par P. E. Foucaux. Paris, 1854, 8vo.—BY THE AUTHOR.

Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen. Deel XXV.—BY THE BATAVIAN SOCIETY.

Natuurkundig Tijdschrift voor Nederlandsch Indie. Deel VI. Aflevering V. and VI.—BY THE SAME.

Tijdschrift voor Indische Taal,—Land,—en Volkenkunde, Jahrgang III.—BY THE SAME.

Anglo-Burmese Hand-Book, or a Guide to a practical knowledge of the Burmese language, compiled by Dr. A. Chase, Maulmein, 1852, oblong 12mo.—BY THE AUTHOR.

Lexicon Geographicum cui titulus est مراد الاعلّاع على اسماء الامكنة و البقا octavum fasciculum, edidit T. G. J. Juynboil, Lugduni Batavorum 1854.—BY THE EDITOR.

Selections from the Records of the Government of the North Western Provinces, part XV.—BY THE GOVERNMENT OF THE N. W. P.

Selections from the Records of the Government of India (Home Dept.) No. V.—BY THE GOVERNMENT OF INDIA.

Ditto ditto, Foreign Department, No. IV.—BY THE SAME.

Report on the Revenue Administration of the Districts comprised in the Hazaribagh Division or South-West Frontier Agency, for 1851-52.—BY THE GOVERNMENT OF BENGAL.

A Short Account of the Ganges Canal.—BY LIEUT.-COL. W. E. BAKER.

Proceedings of the Royal Society, Vol. VII. No. 5.—BY THE SOCIETY.

The Upadeshak, No. 94.—BY THE EDITOR.

The Bibidhārtha Sangraha, No. 30.—BY THE EDITOR.

The Tattwabodhiní Patriká, No. 133.—BY THE TATTWABODHINÍ SOBHA'.

The Calcutta Christian Observer, 1854.—BY THE EDITORS.

The Oriental Baptist, No. 94.—BY THE EDITOR.

The Oriental Christian Spectator, No. for September, 1854.—BY THE EDITOR.

The Citizen for August and September last.—BY THE EDITOR.

The Doorbeen, a Persian Newspaper, for September, 1854.—BY THE EDITOR.

*Exchanged.*

The Athenæum, for July, 1854.

The London, Edinburgh and Dublin Philosophical Magazine, No. 50.

The Calcutta Review, No. 45.

*Purchased.*

Journal des Savants, for July, 1854.

Comptes Rendus, Nos. 1 and 2, for July, 1854.

The Annals and Magazine of Natural History, No. 80.

Chúrnak, 12mo.

Casheenath's System of Logic, 8vo.

Neelratna's Bohoodarsan, 8vo.

Rammohun Roy's Bengali Grammar, 8vo.

Padánka Duta, 12mo.

Atmatattwa Vidyá, 12mo.

Morton's Proverbs, 8vo.

Hatem Tai, in Bengali, 4to.

Sháhnámeh, in Bengali, 4to.

RA'JENDRALA'L MITTRA.

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FOR NOVEMBER, 1854.

At a meeting of the Asiatic Society held on the 1st inst. at half-past 8 P. M.

SIR JAMES COLVILLE, KT. President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

Presentations were received—

1. From the Imperial Academy of Sciences of Vienna, all the publications of the Academy (for detail, vide Library report).

2. From the Royal University of Christiania, all the publications of the University (for detail, vide Library report).

3. From Lt. Col. Baker on the part of R. M. Stephenson, Esq. managing director, E. I. Railway, the following specimens of iron ores, viz. (1) A specimen of coal from Natal, Cape of Good Hope; (2) Specimens of iron ore from Nagpoor, with a memorandum by the Rev. J. Hislop; (3) Specimens of iron and iron ore from the neighbourhood of Poona, &c. in Nimar, with a sample of the iron manufactured therefrom; (4) Specimens of iron and iron ore from near

Midnapore, with sample of the iron manufactured therefrom; (5) Specimens of iron ore and crude iron from 20 miles north of Doya on the More River, Beerbhoom.

4. From Lt.-Col. Baker, a plan of the town and ruins of Rajmahal, showing the site of the proposed Railway Terminus at that station.

5. From C. Grant, Esq. (1) a specimen of coal from Moukmeanouth Colliery Pit, in Durham, (2) specimens of Shale with impressions of ferns, (3) specimens of embedded fresh water mussel, (4) an Ammonite from Whitby and (5) a specimen of iron stone from Dysart in Fifeshire.

The following gentlemen duly proposed and seconded at the last meeting were balloted for, and elected ordinary members.

G. H. Bushby, Esq. C. S. (re-elected).

F. A. Lushington, Esq. C. S. (ditto).

Dr. Boycott, Bombay Medical service.

Lt. N. W. Elphinstone, 4th Regt. N. I.

Lt. H. S. Bivar, 18th Regt. B. N. I.

The following were named for ballot at the next meeting.

G. G. Morris, Esq. C. S., Purneah, proposed by Mr. Grote, and seconded by the President.

Capt. G. H. Saxton, 38th M. N. I. proposed by Mr. Samuells and seconded by Dr. Spilsbury.

Bábu Kissory Chand Mittra, Junr. Magistrate, Calcutta, proposed by Bábu Ramgopaul Ghose and seconded by Bábu Rádánáth Sickdar.

Communications were received—

1. From Dr. Röer, enclosing a paper on the Bibliographical history of the Upanishads.

2. From the Government of the North Western Provinces, through Mr. Under-Secretary Carmichael, Meteorological Register kept at the Secretariat Office at Agra, for the month of September last.

3. From Major A. Cunningham, forwarding a paper entitled "Coins of Indian Buddhist Satraps with Greek Inscriptions."

The following is an extract from Major C.

"When I formerly told you that I thought I could give some information on points that would be interesting to your brother, I meant re-



garding Alexander the Great himself, and not about his successors. Two of these points you will find in the present paper; one about Porus being a descendant of Jajāti and therefore a *Paurava*, the other about the kings being *Māprians*, which establishes the fact of Chandra Gupta being contemporaneous with Alexander the Great. I will now add three points in the Geography; 1st, *Shor-kat* (the capital of the Pergunnah of *Shor* in Akbar's time) was the ancient *Alexandria Sorianè*; 2nd, The Ravi formerly ran past Multan into the Chenab; in fact it completely encircled the Fort, which agrees with what is recorded by the Greeks of the metropolis of the Malli—'Alexander sailed round it.' The old bed is traceable the whole way from Serai Sidhu to Multan; 3rd, The Alexandria founded by Leonatus on the borders of Gedrosia was *Alexandria Melanè*; now Ras Malan on the sea coast.

"I have made some most beautiful discoveries regarding the early wanderings of the Solar and Lunar races, which will be rather startling perhaps at first, but they are nevertheless quite true. Their interest depends on the intimate connexion between them and the dominant races of the west. Thus the Thracians and Macedonians were descended from the same stock as the Afghans. This is not a conjecture, but a plain fact susceptible of *proof*. Suppose we should come upon some people in a distant country living on the banks of a 'River Thames' who called themselves 'men of Kent' and Kentish men, what would be the inference? The Afghans, as you are aware, call themselves *Pashtun* and *Pakhtun* (Pathun or Pathán) and they live on the river Indus or *Abi-sindh*! Now in Thrace there was a river called *Ἀψαθος*, on whose banks live the *Βιστωνιοι* from whom *Βειθωνοι* of Bothynia acknowledged their descent. Here then we have both *Beitun* and *Bistun* on the Assinthus River.

"This is one proof out of many. The Thracians and Bithynians had cities called *Nysa*, with the worship of Dionysus, as had also the people of the Kabul river. I have traced the connecting links of the chain from the Indus to the Atlantic, and I think that I can establish the migration of the Solar race through all the countries which they must have visited. Thus the *Kaspaturus* or Kas Pakturas of India re-appears in *Katapataka* (or Cappadocia) in *Karpathos* Insula, and in the Karpathee montes, or modern *Krapack*. This subject alone will require a single volume.

"But it is the religion, and not the Geography, that affords the most interesting illustrations. Thus Alexander's historians relate that Abissares that is the king of *Sabissa* kept a huge dragon, and that Taxiles kept another, whose worship was similar to that of Dionysus. Remembering that Sabazios is a name of Dionysus; and that *Sabas* is the name of a snake in

the Alpine dialects of the Punjab, we see the connexion between Dionysus with his snakes in baskets and the god *Sabazias*; we see also how the Greek *Σαβαζειν* was formed as it evidently meant to call out ‘Shabash,’ so also *Σεβος* &c. &c. as the priests of Baal called out “O Baal! hear us!” That snake-worship was formerly dominant in India, we all know, but no one has yet attempted to trace it. This I am now doing, but, before writing, I wish to read all that has been written upon snake-worship by European authors, not one of those that I have yet read, has even the faintest idea of its true origin. My illustrations on this subject are most complete, and they most unexpectedly point out the object of Stonehenge and the other stone circles of Britain.”

The Librarian and the Curator of the Museum of Economic Geology submitted their usual monthly reports.

*Report of the Curator Museum of Economic Geology, November, 1854.*

I usually delay reporting upon contributions till I have examined them, but illness and the number of contributions, with many miscellaneous duties and calls, and some very long and intricate researches which I have been following out, have thrown me so much in arrears that I must unwillingly break through my custom and mention only many contributions which I could wish to have examined before doing so.

*Geology and Mineralogy.*—We have received a box of 45 specimens, mostly rocks, from the Coromandel Coast, by a Madras ship; but I have no notice from the donor, nor do I recognise the hand-writing. I have catalogued the localities but have not yet examined them.

We have also received from Mr. Blyth a bottle of Petroleum from Mooltan, also from an unknown donor.

Mr. Oldham’s valuable contribution was exhibited at the October meeting, and it is described in the following letter by him.

From the Superintendent of the Geological Survey to the Secretary, Asiatic Society of Bengal.

*Dated 13th September, 1854.*

SIR,—I have the honor to forward herewith, for the Museum of Economic Geology some boxes of specimens both Geological and Palæontological, which will, I hope, be found valuable additions to its collections.

They consist principally of a fine collection of fossil plants from the Rajmahal hills.

Some rock specimens from ditto ditto.

Ditto ditto from Khasi Hills.

Iron ores and iron from ditto ditto.

Iron ore from Birbhoom.

Tin ore and tin from Tenasserim Provinces.

Iron ditto from Tavoy.

Coal from Namdang in Assam.

I have the honor to be, Sir,

Your most obedient servant,

(Signed) THOS. OLDHAM.

Mr. W. Theobald, Junior, has obliged us with a number of rock specimens from the Punjab, which are not yet examined, nor has any catalogue of them been received.

Major Ramsay, resident of Katmandoo has again obliged us by soliciting and obtaining from H. E. the Minister Jung Bahadoor some very handsome specimens of Nepaulite, with its melted ores, some of which is on the table, and a box of the products of a different mine, which will be examined and reported on in due time, as they require a careful investigation.

We have received from Captain W. S. Sherwill of the Revenue Survey a small Meteorite, of the fall of which, with a number of others, the following extract of a letter from him, gives an account.

“ By to-day’s Dawk Banghy, I have despatched to your address, and for presentation to the Asiatic Society’s Museum, a tin case containing a small Aerolite that fell from the heavens near to the small Military station of Segowlee on the Katmandoo road, and 20 miles from the foot of the outer or lower Himalayas. It was given to me lately when I was at Moteeharee, which is near Segowlee, by Mr. F. A. Glover of the Civil Service, Joint-Magistrate of Chumparun, who also kindly gave me the following description of its fall.

“ ‘ The stone or rather stones, for there were several, (I saw five or six) fell about mid-day of the 4th March, 1853, no noise accompanied their fall; nor were they *seen* falling; a man and a boy who were engaged in the fields were startled by hearing heavy thumps on the ground caused by the falling stones, they picked up the stones and brought them to their village,\* from whence they were taken by some of the Irregular Cavalry Sowars to Segowlee. The adjutant of the corps, Lieut. Macdougall gave me one large stone, and I procured two smaller ones (one of which I gave you) from the village near which they fell.’

“ There seems to be no reasonable doubt but that the stones fell as

\* A small village a few miles South of Segowlee.—W. S. S.

stated, though this certainly rests on native testimony merely ; but in this case, no object could be gained by falsehood.

“The nearest rock to the spot is 20 miles in a northerly direction as the crow flies.

(Signed) “W. S. SHERWILL.”

*Patna, 24th November, 1854.*

The stone is undoubtedly a Meteorite, but we cannot afford to break this valuable little specimen to obtain a large fracture ; we can only then, judging from the small chips taken off, say that it greatly resembles Dr. Tytler's Meteorites which also fell with a great number of others near Allahabad some thirty or forty years ago.

#### ECONOMIC GEOLOGY.

Our acquisitions here are very numerous and rich, and one of them indeed probably of immense importance.

Captain Hannay's iron ores and paper on the history of iron in Assam have already been before the Society.

The Kumaon iron ores of Lt.-Col. Drummond with his memorandum, and those from Mr. Stephenson presented through Lt.-Col. Baker have been already brought forward at a late meeting.

Mr. Taylor of Burdwan has obliged as with some fine specimens of the iron ores of Burdwan.

Mr. Allen of the N. W. Dawk Company has sent for examination some supposed copper ore or *gossan* from the neighbourhood of Simla. It proves however to be a soft ferruginous shale without any trace of copper.

I said above that one of our acquisitions in this department is of immense importance ; and this will be understood when I say that, after some difficulty, I have at length procured through the kindness of Capt. Niblett of the H. C. Steamer *Sesostris*, a bag of the Ava coal which we some time ago saw announced in the newspapers, and that upon examination it proves to be a first rate Steam coal, equal to some of the best Welsh Steam coals, the Pont-y-pool and another, which it almost exactly resembles. I have been also able to ascertain from Major Burney's Ava specimens in our collection that the locality of this coal is the Kyendwen River which falls into the Irrawaddy a little above Yandaboo, about 200 miles from our frontier post Meaday ; for a Jet coal from that locality of which also Captain Niblett has brought us some very inferior specimens, was analysed by Mr. James Prinsep and of this there are also specimens in Major Burney's collection



but (probably from there being only one specimen of our fine bituminous looking coal) he has not analysed it; and it is a curious comment on the importance of the old collections, and those from distant countries, that at the distance of nearly a quarter of a century they should afford us not only this information, but also serve to put us on our guard when we attempt to pronounce on the value of the coal; for had only our inferior Jet coal been brought to us, we should have pronounced it as nearly worthless, which it is as a steam coal. Mr. Prinsep's jet coal will no doubt be found in time. Ours is probably a mere surface shale, though I can detect no organic remains.

The value of a really good steam coal, not only in Ava, but for all our sea-going steamers, whether public or private, I need not further remark upon.

H. PIDDINGTON.

The following additions have been made to the library since the October meeting.

*Presented.*

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, mathematisch-naturwissenschaftliche Classe, Band I. Band VI. 5 heft, Band VII. heft I. Band IX. hefts III. to V. Bands X. and XI. Band XII. hefts I. @ IV. and a vol. of plates.—BY THE IMPERIAL ACADEMY OF VIENNA.

Ditto ditto, philosophisch-historische Classe. Band I. Band VII. 1. and 2 hefts. Band IX. hefts III. @ V. Band X. and XI. and XII. heft I. to IV.—BY THE SAME.

Archiv für Kunde österreichischer Geschichtsquellen. Band I. @ XII.—BY THE SAME.

Fontes Rerum Austriacarum, Österreichische Geschichts-quellen, vols. I. to VII.—BY THE SAME.

Die Vegetationsverhältnisse von Iglau, von Alois Pokory. Wien, 1852, 8vo.—BY THE SAME.

Genera et Species Plantarum Fossilium, auctore F. Unger, Vendobonae, 1850, 8vo.—BY THE SAME.

Versuch einer Geschichte der Pflanzenwelt, von Dr. F. Unger. Wien, 1852, 8vo.—BY THE SAME.

Systema Helminthum, auctore C. M. Diesing, 2 vols. 8vo.—BY THE SAME.

Monumenta Habesburgica, vol. I.—BY THE SAME.

Erster Bericht über die zur Dampfschiffahrt geeigneten Stienkohlen

England's. Von Sir Henry de la Beche und Dr. Lyon Plaifair, 8vo.—BY THE SAME.

Das Mosaisch-rabbinische Civilrecht bearbeitet von H. B. Fassel, vol. I. 8vo.—BY THE SAME.

Monumenta Linguae Palaeoslovenicae e Codice suprasliensi edidit F. Miklosich, 1 vol. 8vo.—BY THE SAME.

Entwurf eines Meteorologischen Beobachtungssystems für die österreichische Monarchie, von Carl Kreil.—BY THE SAME.

Die Grotten und Höhlen von Adelsberg, Lueg, Planina und Laas. Von A. Schmidt, 1 vol. 8vo. with a vol. of plates.—BY THE SAME.

Deutsche Gedichte des XI. und XII. Jahrhunderts, von J. Diemer. Wien, 1849, 8vo.—BY THE SAME.

Notizenblatt, Beilage zum Archiv für Kunde österreichischer Quellen, for 1851-52-53.—BY THE SAME.

Die Kechua Sprache, von J. J. V. Tschudi, 2 vols. 8vo.—BY THE SAME.

Almanach for 1851-52-53 and 54.—BY THE SAME.

Die antiken Gold- und silber monumente des K. K. Münz und Antiken Cabinettes in Wien. Beschrieben von J. Arneth, folio 2 vols.—BY THE SAME.

Die Alterthümer von Hallstatter Salzberg und Dessen Umgebung, von F. Simony, oblong folio.—BY THE SAME.

Archæologische Analecten von J. Arneth, Wien, 1851, oblong folio.—BY THE SAME.

Das Verbrüderungs Buch des stiftes S. Peter zu Salzburg von Th. G. V. Krajan, Wien, 1852, folio.—BY THE SAME.

Denkschriften der Kaiserlichen Akademie der Wissenschaften, mathematisch-naturwissenschaftliche Classe, vols. IV. to VII.—BY THE SAME.

Ditto ditto philosophisch-historische Classe, IV.-V. Band.—BY THE SAME.

Intigration der Linearen Differential Gleichungen mit constanen und veränderlichen co-efficienten von Dr. J. Petzval, 2 parts, 4to.—BY THE SAME.

Tafeln zu dem Portrage; der Polygraphische Apparat der K. K. Hof- und Staatsdruckerrei zu Wien, 8vo. pamphlet.—BY THE SAME.

Regesten zur Geschichte der Markgrafen und Herzoge österriechs aus dem House Babenberg, von Andreas von Meiller, 4to.—BY THE SAME.

Statistiske Tabeller for Kongeriget Norge, udgivne efter Foranstaltning af Departementet for det Indre, Ellefte Rakke.—BY THE ROYAL UNIVERSITY OF CHRISTIANIA.

Jury Institutionen af Munch Ræder, 2 Bonds, 2 hefte.—BY THE SAME.

Olaf den Helliges Saga und Snorre Sturlasson, Christiania, 1853.—BY THE SAME.

Nyt Magazin for Naturvidenskaberne. 5 Nos. for 1853.—BY THE SAME.

Barlaams og Josaphats Saga, Christiania, 1851, 8vo.—BY THE SAME.

Olaf Tryggvesöns Saga ved odd Munk, Christiania, 1853, 8vo.—BY THE SAME.

Det Kongelige Norske Frederiks Universitets Aarsberetning, for 1851, 12mo.—BY THE SAME.

Berzeichnik der Verlags und Commissions Artikel von Carl Wilhem Leske in Darmstadt.—BY THE SAME.

Syphilisationsforsög foretagne af W. Boeck, Christiania, 1853, 12mo.—BY THE SAME.

Bidrag til Pectini branchiernes Udviklings Historie af J. Koron og D. C. Danielsen, Bengen, 2 8vo. pamphlets.—BY THE SAME.

Beretning om Kongeriget Norges økonomiske Tilstand i aarene, 1846-50, Christiania, 1853, 4to.—BY THE SAME.

Norsk Lappisk Ordbog, Af Nils Vebe Stock fleth, Christiania, 1852, 8vo.—BY THE SAME.

Strengleikar eda Liodabok af R. Keyser og C. R. Unger, Christiania, 1850, 8vo.—BY THE SAME.

Om den Spidalske Sygdom Elephantiasis Græcorum af C. W. Boeck, Christiania, 1842, 8vo.—BY THE SAME.

Natuurkundig Tijdschrift voor Nederlandsch Indie, Deel VII.

Monographie des Guepes Sociales, on de la Tribudes Vespiens, Par de Saussure, Nos. 1, 3, 4, 6.—BY THE AUTHOR.

Ethnology of the Indo-Pacific Islands, by J. R. Logan, 2 parts.—BY THE AUTHOR.

The Indian Annals of Medical Science, No. III.—BY THE EDITOR.

Report on the Revenue Administration of the Province of Assam, for 1851-52.—BY THE GOVERNMENT OF BENGAL.

The Oriental Christian Spectator, for October, 1854.—BY THE EDITOR.

The Mineral Waters of India, with some hints on spas and sanatoria. By J. McPherson, M. D.—BY THE AUTHOR.

*Exchanged.*

Calcutta Review, No. 45.

*Purchased.*

Bhaktitatwasára, 1 vol. 8vo.

Kabiranjan, 1 vol. 12mo.

Sarvajnyan Munjari, 1 vol. 12mo.  
 Golébakáwali, 1 vol. 12mo.  
 Gita Govinda, 1 vol. 8vo.  
 Ajnán Timiranáshaka, 1 vol. 8vo.  
 Chikitsárnab, 1 vol. 8vo.  
 Chaitanya Sangita, 1 vol. 8vo.  
 Uddhabadúta, 1 vol. 8vo.  
 Iblisnáme, 1 vol. 8vo.  
 Nala Damayanti, 1 vol. 8vo.  
 Sárábali, 1 vol. 8vo.  
 Pákarájeswara, 1 vol. 8vo.  
 Párasya Itihása, 1 vol. 8vo.  
 Ananda Lahari, 1 vol. 8vo.  
 Káli Bilása, 1 vol. 8vo.  
 Purusha Paríkshá, 1 vol. 8vo.  
 Batris-síngghásan, 1 vol. 8vo.  
 Dandi Parba, 1 vol. 8vo.  
 Romeo and Juliet in Bengali, 1 vol. 12mo.  
 Kimiá Vidyá Sára, 1 vol. 12mo.  
 Saga-ullá, 1 vol. 8vo.  
 Satya Itihása Sára, 1 vol. 8vo.  
 Svaḍvinsat Bákhyán, 1 vol. 12mo.  
 Adbhuta Rámáyana, 1 vol. 12mo.  
 Sankar Sára, 1 vol. 8vo.  
 Cháhár-Durvesh, 1 vol. 8vo.

1st Nov., 1854.

RA'JENDRALA'L MITTRA.

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FOR DECEMBER, 1854.

The Society met on the 6th instant at half-past 8 P. M.

SIR JAMES COLVILLE, KT., President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

Presentations were received—

1. From Captain T. C. Dalton, Debrughur, Assam, 10 silver coins of the Patan Sultans of Bengal (vide proceedings for September last).

2. From Bábu Rádhánáth Sikdár, 2 copies of the Másaik Patriká, No. IV.



3. From Mons. G. A. Durand, General Secretary to the Imperial Academy of Sciences at Bordeaux, the Journal of the Society for 1853-54.

4. From H. Piddington, Esq. copy of an Essay on Agricultural Science as a branch of Native Education.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected ordinary members.

G. G. Morris, Esq. C. S.

Capt. G. A. Saxton, 38th M. N. I.

Bábu Kissorychand Mittra.

The Chairman on behalf of the Council gave notice of their intention, at the next anniversary meeting, to propose the following modification of Rule 6.

“Candidates for admission as ordinary members may be proposed by any ordinary member who has received authority from the candidate to propose him, and must be seconded by another ordinary member. The proposal shall be laid,” &c. (the rest as in the old rule).

Read letters—

1. From Rev. J. Long, suggesting that the Society should recommend to the Government the propriety of preserving the ruins of Rajmahal from spoliation.

The following is an extract from Rev. J. Long's letter :

“The preservation of the most interesting part of the ruins of Rajmahal which was the capital of Bengal only two centuries ago, ‘the city of one hundred kings’ is a subject deserving the attention of the Asiatic Society, and in accordance with a despatch which the Court of Directors sent to this country nine years ago respecting the preservation of antiquarian objects.

“Rajmahal will be an important station of the Railway Company and as the space for railway works is limited there, it is to be feared that hereafter men ignorant of the past history of this country and looking on the ruins with a Benthamite eye may cast off all that would interest the love of the past as mere rubbish.

“On the principle that prevention is better than cure, it would be well if steps could be now taken to save some of these ‘land-marks on the sea of time.’ We have few ruins in the Lower Pro-

vinces to point out to the gaze of the tourist or antiquarian, and these ruins if kept in preservation would be hereafter very interesting to railway travellers and others.”

The Secretary explained that a representation had already been made to the Lieut.-Governor on the subject by direction of the Council.

2. From Prof. Anger, Librarian of the German Oriental Society conveying thanks of the Society for Nos. 43 to 74 of the *Bibliotheca Indica*, and No. VII. of 1853 and I. of 1854 of the *Journal*.

3. From C. P. Carmichael, Esq. Assistant Secretary to the Government of the N. W. Provinces. Meteorological Register kept at the Secretariat office of the N. W. Provinces for the month of October, 1854.

4. From H. Piddington, Esq. submitting the following papers, viz. :—

1st. Examination and analysis of a jet coal from the banks of the Teesta River.

2nd. Ditto ditto, two specimens of coal from Ava.

The Curator of the Geological Department and the Librarian submitted reports of additions made in their respective Departments.

#### LIBRARY.

The additions to the library during the past month have been the following :—

#### *Presented.*

Life of Mohammad in Bengali, Calcutta, 1854, 8vo.—BY THE REV. J. LONG.

Selections from the Records of the Bengal Government, No. XVI. 2 copies.—BY THE GOVERNMENT OF BENGAL.

Joseph's Map of the Grand Trunk Road, 3rd Section, Agra to Ferozepore.—BY THE SAME.

Selections from the Records of Government of the North-Western Provinces, Part XVI.—BY THE GOVERNMENT OF THE N. W. PROVINCES.

Range of the Thermometer at Nynee Tal, from 1st January to 31st December, 1853.—BY THE SAME.

Recueil des Actes de l'Academie des Sciences, Belles-lettres et Arts de Bordeaux, No. 1 for 1851-52 and Nos. 2, 3 and 4 of 1853.—BY THE ACADEMY.

Selections from the Public Correspondence of the Punjab Administration, No. IX. 4 copies.—BY THE PUNJAB ADMINISTRATION.

Report of the Revenue Administration of the Lower Provinces for the official year 1852-53.—BY THE GOVERNMENT OF BENGAL.

Astronomical Observations made at the Hon'ble the East India Company's Observatory at Madras; for 1848-52.—BY THE MADRAS GOVERNMENT.

Proceedings of the Royal Society, No. 6.—BY THE SOCIETY.

Másika Patriká, No. IV. 2 copies.—BY THE EDITORS.

The Oriental Baptist, No. 95-6.—BY THE EDITOR.

Upadeshak, Nos. 95-6.—BY THE EDITOR.

The Calcutta Christian Observer, No 180.—BY THE EDITORS.

The Oriental Christian Spectator, for Nov. 1854.—BY THE EDITOR.

The Bibidhártha Sañgraha, No. 31.—BY THE EDITOR.

*Purchased.*

The Annals and Magazine of Natural History for September, 1854.

Comptes Rendus, Nos. 5 to 10.

Dec. 6th, 1854.

RA'JENDRALA'L MITTRA.



# Abstract of Meteorological Observations for the month of May, 1853.

Rangoon, 1st June, 1853.

| Thermometer<br>Sunrise. | Thermometer<br>9 A. M. |          |                                           | Thermometer<br>Noon. |          |                                           | Thermometer<br>3 P. M. |          |                                           | Thermometer<br>Sunset. |          |                                           | Thermometer<br>9 P. M. |          |                                           | Remarks.                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|------------------------|----------|-------------------------------------------|----------------------|----------|-------------------------------------------|------------------------|----------|-------------------------------------------|------------------------|----------|-------------------------------------------|------------------------|----------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.             | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. |                                                                                                                                                                                                                                                                                                                                                                              |
| Wet....                 | 80.5                   | 74.5     | 78.450                                    | 76.744               | 79       | 74.5                                      | 81                     | 74.5     | 78.724                                    | 81.5                   | 75       | 90.914                                    | 78.896                 | 76.5     | 79.5                                      | The weather this month has been un-<br>settled, cloudy and frequently wet ;<br>squalls of wind and rain with light-<br>ning at sunset and during the night.<br>Prevailing winds in early part of the<br>month in the mornings W. N. W.<br>S. W. or W. S. W. in the afternoon.<br>Latterly prevailing in the S. W.<br>Up to sunrise of 1st June, 80.4 inches<br>of rain fell. |
|                         | 74.5                   | 74.5     | 78.450                                    | 76.744               | 74.5     | 74.5                                      | 81                     | 74.5     | 78.724                                    | 81.5                   | 75       | 90.914                                    | 78.896                 | 76.5     | 79.5                                      |                                                                                                                                                                                                                                                                                                                                                                              |
| Dry....                 | 80.5                   | 74.5     | 78.450                                    | 76.744               | 79       | 74.5                                      | 81                     | 74.5     | 78.724                                    | 81.5                   | 75       | 90.914                                    | 78.896                 | 76.5     | 79.5                                      |                                                                                                                                                                                                                                                                                                                                                                              |
|                         | 74.5                   | 74.5     | 78.450                                    | 76.744               | 74.5     | 74.5                                      | 81                     | 74.5     | 78.724                                    | 81.5                   | 75       | 90.914                                    | 78.896                 | 76.5     | 79.5                                      |                                                                                                                                                                                                                                                                                                                                                                              |
| Barometer<br>Sunrise.   | 30.094                 | 29.91    | 29.815                                    | 30.10                | 29.94    | 29.781                                    | 30.09                  | 29.92    | 29.847                                    | 30.04                  | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    |                                                                                                                                                                                                                                                                                                                                                                              |
|                         | 30.094                 | 29.91    | 29.815                                    | 30.10                | 29.94    | 29.781                                    | 30.09                  | 29.92    | 29.847                                    | 30.04                  | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    |                                                                                                                                                                                                                                                                                                                                                                              |
| Barometer<br>9 A. M.    | 30.10                  | 29.94    | 29.781                                    | 30.09                | 29.92    | 29.847                                    | 30.04                  | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
|                         | 30.10                  | 29.94    | 29.781                                    | 30.09                | 29.92    | 29.847                                    | 30.04                  | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
| Barometer<br>Noon.      | 30.09                  | 29.92    | 29.847                                    | 30.04                | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
|                         | 30.09                  | 29.92    | 29.847                                    | 30.04                | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
| Barometer<br>3 P. M.    | 30.04                  | 29.80    | 29.717                                    | 30.14                | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
|                         | 30.04                  | 29.80    | 29.717                                    | 30.14                | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
| Barometer<br>Sunset.    | 30.09                  | 29.92    | 29.847                                    | 30.04                | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
|                         | 30.09                  | 29.92    | 29.847                                    | 30.04                | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
| Barometer<br>9 P. M.    | 30.09                  | 29.92    | 29.847                                    | 30.04                | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
|                         | 30.09                  | 29.92    | 29.847                                    | 30.04                | 29.80    | 29.717                                    | 30.14                  | 29.89    | 29.761                                    | 30.05                  | 29.80    | 29.774                                    | 30.05                  | 29.80    | 29.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |

J. FAYRER, M. D. Asst. Surgeon,  
Field Hospital, Rangoon.



| Date.  | SUNRISE.     |        |                              |                |            | Aspect of Sky. | Rain.  | 9 A. M.      |           |                 |                              |                | Aspect of Sky. | Thermometer. |               | Baro-<br>meter. | Force and direction of Wind. | Aspect of Sky. | Thermometer.    |                              | Baro-<br>meter. | Force and direction of Wind. | Aspect of Sky. |                |
|--------|--------------|--------|------------------------------|----------------|------------|----------------|--------|--------------|-----------|-----------------|------------------------------|----------------|----------------|--------------|---------------|-----------------|------------------------------|----------------|-----------------|------------------------------|-----------------|------------------------------|----------------|----------------|
|        | Thermometer. |        | Force and direction of Wind. | Aspect of Sky. | Rain.      |                |        | Thermometer. |           | Baro-<br>meter. | Force and direction of Wind. | Aspect of Sky. |                | Thermometer. |               |                 |                              |                | Baro-<br>meter. | Force and direction of Wind. |                 |                              |                | Aspect of Sky. |
|        | Wet.         | Dry.   |                              |                |            |                |        | Wet.         | Dry.      |                 |                              |                |                | Wet.         | Dry.          |                 |                              |                |                 |                              |                 |                              |                |                |
| 1      | 77           | 79     | W.N.W.lt.                    | 29.72          | Clear.     | ..             | 78.5   | 89.5         | W.S.W.f.  | 29.80           | †                            | 78             | 99             | 29.80        | W.S.W.f.      | Cumuli.         |                              |                |                 |                              |                 |                              |                |                |
| 2      | 78           | 80     | Ditto                        | 29.78          | Ditto      | ..             | 79     | 90           | Ditto lt. | 29.85           | Ditto                        | 80             | 97.5           | 29.82        | S.W. do.      | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 3      | 77           | 79.5   | Ditto                        | 29.80          | Ditto      | ..             | 79     | 88           | W.S.W.f.  | 29.864          | †                            | 79             | 98             | 29.78        | S.W. lt.      | Cumuli.         |                              |                |                 |                              |                 |                              |                |                |
| 4      | 76           | 78.5   | Ditto                        | 30.79          | Ditto      | ..             | 78.5   | 89.5         | W.S.W.f.  | 29.822          | Clear.                       | 76             | 99             | 29.822       | W.S.W.lt.     | Scd.lt.cum.     |                              |                |                 |                              |                 |                              |                |                |
| 5      | 76           | 79     | Ditto                        | 29.72          | Ditto      | ..             | 77     | 87           | W.S.W.lt  | 29.83           | Cumuli.                      | 77.5           | 97.5           | 29.83        | w.s.w.std.    | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 6      | 75.5         | 79     | Calm.                        | 29.78          | Foggy.     | ..             | 78     | 85           | Ditto     | 29.84           | \$                           | 76.5           | 97.5           | 29.84        | Ditto         | Lt fleecy c     |                              |                |                 |                              |                 |                              |                |                |
| 7      | 76           | 78.5   | Ditto                        | 30.27          | Lt. cirri. | ..             | 78     | 87.5         | Ditto     | 29.90           | Ditto                        | 78             | 97.5           | 30.77        | Ditto         | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 8      | 75.5         | 78     | ....                         | 29.77          | ....       | ..             | 78.5   | 85.5         | Ditto     | 29.84 | \|\| | 81.5           | 96.5           | 29.763       | S.W. fog.     | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 9      | ..           | 74.5   | ....                         | 29.77          | Clear.     | 0.56           | 77     | 84           | S.W. lt.  | 29.84           | Clear.                       | 78.5           | 90.5           | 29.82        | S. lt. [able. | Do. strati.     |                              |                |                 |                              |                 |                              |                |                |
| 10     | 74.5         | 77.5   | ....                         | 29.81          | ....       | 0.22           | 78     | 82           | S. lt.    | 29.84           | Cdy. & cl.                   | 78.5           | 90.5           | 29.81        | N. change.    | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 11     | 78           | 80     | W.S.W.                       | 29.78          | Cum.-st.   | ..             | 79     | 85.5         | S.W. lt.  | 29.84           | Clear.                       | 79             | 95.5           | 29.792       | S. by E. do.  | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 12     | 76           | 78     | S.b.W.lt.                    | 29.72          | Cumuli.    | ..             | 77.5   | 83           | Ditto     | 29.78           | Ditto                        | 78             | 95             | 29.75        | S.W. lt.      | ....            |                              |                |                 |                              |                 |                              |                |                |
| 13     | 77           | 79     | ....                         | 29.73          | Clear.     | ..             | 79.5   | 85           | Ditto     | 29.78           | Ditto                        | 81             | 76             | 29.74        | Ditto         | Sirri.          |                              |                |                 |                              |                 |                              |                |                |
| 14     | 76.5         | 79     | ....                         | 29.72          | ....       | ..             | 79     | 83.5         | Ditto     | 29.76           | Cirri.                       | 77.5           | 97             | 29.75        | S. by E. lt.  | Cum. hazy.      |                              |                |                 |                              |                 |                              |                |                |
| 15     | 78           | 80.5   | ....                         | 29.71          | ....       | ..             | 79     | 84           | Ditto     | 29.77           | Ditto st.                    | 81.5           | 96             | 29.74        | N.W. lt.      | ....            |                              |                |                 |                              |                 |                              |                |                |
| 16     | ..           | *      | ....                         | ..             | ....       | 1.80           | ..     | ..           | ....      | ..              | ....                         | ..             | ..             | ..           | Ditto         | ....            |                              |                |                 |                              |                 |                              |                |                |
| 17     | 74.5         | 75     | N.W. lt.                     | 29.71          | ....       | 1.20           | 74.5   | 75           | N.E. lt.  | 29.76           | Strati.                      | 75             | 73.5           | 29.71        | Ditto         | Strati. Rain.   |                              |                |                 |                              |                 |                              |                |                |
| 18     | 75           | 75.5   | Ditto                        | 29.69          | ....       | 1.70           | 76     | 77           | N.W. lt.  | 29.72           | Ditto                        | 77             | 78.5           | 29.70        | Ditto         | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 19     | 74.5         | 76     | Ditto                        | 29.70          | ....       | 0.05           | 79     | 81.5         | Ditto.    | 29.75           | Cumuli.                      | 80.5           | 89.5           | 29.752       | Ditto         | Cumuli.         |                              |                |                 |                              |                 |                              |                |                |
| 20     | 78.5         | 80     | Calm.                        | 29.74          | ....       | ..             | 79     | 86.5         | Ditto.    | 29.81           | Ditto                        | 79             | 85.5           | 29.79        | W.N.W.lt.     | Cirro-strati.   |                              |                |                 |                              |                 |                              |                |                |
| 21     | 78.5         | 80     | Ditto                        | 29.788         | ....       | ..             | 80     | 85           | W.S.W.    | 29.822          | Cumuli.                      | 80             | 91.5           | 29.82        | ....          | Cumuli.         |                              |                |                 |                              |                 |                              |                |                |
| 22     | 78           | 79.5   | S.W. lt.                     | 29.81          | Cirri.     | ..             | 80     | 85.5         | Ditto     | 29.87           | Ditto                        | 79             | 92             | 29.84        | Ditto         | A few scatd.    |                              |                |                 |                              |                 |                              |                |                |
| 23     | 78           | 79.5   | Ditto                        | 29.824         | Ditto      | ..             | 81     | 86           | Ditto     | 29.87           | Ditto                        | 80             | 90.5           | 29.856       | W.S.W.lt.     | .. [cum.        |                              |                |                 |                              |                 |                              |                |                |
| 24     | 79           | 80.5   | Ditto                        | 29.81          | Cirri-st.  | 0.05           | 81     | 83.5         | Ditto     | 29.85           | Ditto                        | 82             | 89             | 29.84        | Ditto         | Cum. strati.    |                              |                |                 |                              |                 |                              |                |                |
| 25     | 77           | 78.5   | W.S.W.lt.                    | 29.82          | Ditto      | 0.05           | 80     | 83           | Ditto     | 29.88           | Ditto                        | 77             | 80             | 29.84        | Ditto         | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 26     | 77           | 78     | Ditto                        | 29.78          | Ditto      | 0.05           | 79     | 80           | S.W. lt.  | 29.82           | Strati.                      | 78             | 79             | 29.78        | W.N.W.lt.     | Strati. Rain.   |                              |                |                 |                              |                 |                              |                |                |
| 27     | 76           | 77     | Ditto                        | 29.74          | Ditto      | 0.35           | 79     | 81           | Ditto     | 29.80           | Cumuli-st.                   | ..             | ..             | ..           | Ditto         | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 28     | 77           | 79     | Ditto                        | 29.76          | Cirri-cum. | .06            | 80.5   | 84.5         | Ditto     | 29.80           | Cr.-cumuli                   | 81             | 90             | 29.78        | ....          | Cumuli.         |                              |                |                 |                              |                 |                              |                |                |
| 29     | 77           | 79     | Ditto                        | 29.79          | Ditto      | 1.10           | 78.5   | 83           | Ditto     | 29.82           | Ditto                        | 81             | 90             | 29.89        | Ditto         | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 30     | 76.5         | 77.5   | S.W. lt.                     | 29.88          | Cumuli-st. | 1.10           | ..     | ..           | ....      | ..              | ....                         | 80             | 85             | 29.78        | W. f.         | Ditto           |                              |                |                 |                              |                 |                              |                |                |
| 31     | 77           | 78     | W.S.W.lt.                    | 29.74          | Cirro-st.  | .05            | 80     | 82           | Ditto     | 29.80           | Ditto                        | 78             | 81             | 29.77        | Ditto         | Cum. strati.    |                              |                |                 |                              |                 |                              |                |                |
| Total. | 222.5        | 2353.5 | ....                         | 894.452        | ....       | 7.24           | 228.3  | 2442.5       | ....      | 863.628         | ....                         | 223.8          | 2656.5         | 864.985      | ....          | ....            |                              |                |                 |                              |                 |                              |                |                |
| Mean.  | 76.724       | 78.45  | ....                         | 29.815         | ....       | ..             | 78.724 | 84.224       | ....      | 29.781          | ....                         | 78.8966        | 90.914         | 29.827       | ....          | ....            |                              |                |                 |                              |                 |                              |                |                |

\* No observation. † Clear a few light cumuli rising in S. W. ‡ Clear a few light fleecy cumuli S. W. § Clear a few light cirri. Cumuli scat'd. over sky.

\* No observation. † Clear a few light cumuli rising in S.W. ‡ Clear a few light fleecy cumuli S.W. § Clear a few light cirri. || Cumuli scat'd. over sky.

| 3 P. M.      |        |                              |               |                |            |              |      |                              |        | SUNSET.        |            |              |                   | 9 P. M.                      |      |                |            | Remarks.     |                   |    |   |
|--------------|--------|------------------------------|---------------|----------------|------------|--------------|------|------------------------------|--------|----------------|------------|--------------|-------------------|------------------------------|------|----------------|------------|--------------|-------------------|----|---|
| Thermometer. |        | Force and direction of Wind. |               | Aspect of Sky. |            | Thermometer. |      | Force and direction of Wind. |        | Aspect of Sky. |            | Thermometer. |                   | Force and direction of Wind. |      | Aspect of Sky. |            |              |                   |    |   |
| Wet.         | Dry.   | Barometer.                   | Wet.          | Dry.           | Barometer. | Wet.         | Dry. | Barometer.                   | Wet.   | Dry.           | Barometer. | Wet.         | Dry.              | Barometer.                   | Wet. | Dry.           | Barometer. |              |                   |    |   |
| 79           | 101.5  | 29.73                        | S. W. lt.     | Cumuli.        | ..         | ..           | ..   | ..                           | 77     | 85             | 29.58      | S. W. lt.    | Clear.            | 29.58                        | 85   | 77             | 85         | S. W. lt.    | Clear.            | a  |   |
| 80           | 100    | 29.75                        | S. W. steady. | Ditto          | ..         | ..           | ..   | ..                           | 75     | 86             | .79        | W. N. W.     | Clear steady.     | .79                          | 86   | 75             | 86         | W. N. W.     | Clear steady.     | b  |   |
| 78           | 101.5  | 29.74                        | S. W.         | Ditto          | ..         | ..           | ..   | ..                           | 75     | ..             | ..         | ..           | ..                | ..                           | ..   | ..             | ..         | ..           | ..                | c  |   |
| 76.5         | 101    | 29.72                        | S. W. fog.    | Sq. cum.       | ..         | ..           | ..   | ..                           | 77.5   | 85.5           | .78        | ..           | ..                | ..                           | ..   | ..             | ..         | ..           | ..                | d  |   |
| 79           | 100    | 29.766                       | Ditto         | Cumuli.        | ..         | ..           | ..   | ..                           | 77     | 86             | .83        | S. W. lt.    | Clear.            | .83                          | 86   | 77             | 86         | S. W. lt.    | Clear.            | e  |   |
| 80.5         | 88.5   | 29.58                        | Ditto         | Ditto          | ..         | ..           | ..   | ..                           | 79.5   | 85             | .82        | Ditto        | Ditto.            | .82                          | 85   | 79.5           | 85         | Ditto        | Ditto.            | f  |   |
| 83           | 96.5   | 29.81                        | Ditto         | Ditto          | ..         | ..           | ..   | ..                           | 71     | 75             | .84        | S. E. f.     | Sqs. lfg. & rain. | .84                          | 75   | 71             | 75         | S. E. f.     | Sqs. lfg. & rain. | g  |   |
| 79.5         | 97.5   | 29.71                        | S. by W. lt.  | Ditto          | ..         | ..           | ..   | ..                           | 75     | 78.5           | .75        | Ditto        | Cumuli.           | .75                          | 78.5 | 75             | 78.5       | Ditto        | Cumuli.           | h  |   |
| 78           | 92.5   | 29.77                        | W. N. W. lt.  | Ditto          | ..         | ..           | ..   | ..                           | 79     | 83.5           | .82        | S. W. lt.    | Clear.            | .82                          | 83.5 | 79             | 83.5       | S. W. lt.    | Clear.            | i  |   |
| 80           | 93.5   | 29.71                        | S. S. E. f.   | Ditto          | ..         | ..           | ..   | ..                           | 77.5   | 82.5           | .74        | S. lt.       | Cumuli strati.    | .74                          | 82.5 | 77.5           | 82.5       | S. lt.       | Cumuli strati.    | j  |   |
| 81.5         | 97.5   | 29.646                       | Ditto         | Ditto          | ..         | ..           | ..   | ..                           | 80     | 83             | .74        | Ditto        | Clear.            | .74                          | 83   | 80             | 83         | Ditto        | Clear.            | k  |   |
| 83.5         | 99.5   | 29.67                        | S. E. lt.     | Cumuli.        | ..         | ..           | ..   | ..                           | 82     | 88             | .76        | ..           | Cumuli-strati.    | .76                          | 88   | 82             | 88         | ..           | Cumuli-strati.    | l  |   |
| 82.5         | 97     | 29.64                        | Ditto         | Ditto          | ..         | ..           | ..   | ..                           | 74.5   | 75             | .77        | S. W. f.     | Cumuli.           | .77                          | 75   | 74.5           | 75         | S. W. f.     | Cumuli.           | m  |   |
| 74.5         | 75.5   | 29.64                        | ..            | Ditto          | ..         | ..           | ..   | ..                           | 75     | 76             | .71        | N. b. W. lt. | Strati.           | .71                          | 76   | 75             | 76         | N. b. W. lt. | Strati.           | n  |   |
| 77           | 80.5   | 29.64                        | ..            | Cumuli.        | ..         | ..           | ..   | ..                           | 75     | 77             | .69        | Ditto        | Ditto.            | .69                          | 77   | 75             | 77         | Ditto        | Ditto.            | o  |   |
| 80           | 92     | 29.67                        | S. by E.      | Den. clds.     | ..         | ..           | ..   | ..                           | 79     | 82.5           | .75        | ..           | Ditto.            | .75                          | 82.5 | 79             | 82.5       | ..           | Ditto.            | .. | p |
| 82.5         | 91.5   | 29.72                        | S. W.         | Cirri-st.      | ..         | ..           | ..   | ..                           | 80     | 83             | .81        | S. W. lt.    | Cirri-strati.     | .81                          | 83   | 80             | 83         | S. W. lt.    | Cirri-strati.     | q  |   |
| 83           | 93     | 29.766                       | Ditto         | Cumuli.        | ..         | ..           | ..   | ..                           | 78.5   | 82.5           | .83        | Ditto        | Cumuli-strati.    | .83                          | 82.5 | 78.5           | 82.5       | Ditto        | Cumuli-strati.    | r  |   |
| 81           | 93.5   | 29.78                        | Ditto         | Ditto          | ..         | ..           | ..   | ..                           | 79     | 82.5           | .85        | ..           | Cirri-strati.     | .85                          | 82.5 | 79             | 82.5       | ..           | Cirri-strati.     | .. | s |
| ..           | ..     | ..                           | N. W.         | Den. clds.     | ..         | ..           | ..   | ..                           | 78     | 79.5           | .82        | Ditto        | Clear.            | .82                          | 79.5 | 78             | 79.5       | Ditto        | Clear.            | .. | t |
| 83           | 89     | 29.80                        | S. W. lt.     | Strati.        | ..         | ..           | ..   | ..                           | 75.5   | 77.5           | ..         | ..           | ..                | ..                           | ..   | ..             | ..         | ..           | ..                | .. | u |
| 77.5         | 81     | 29.76                        | S. lt.        | Cirri-st.      | ..         | ..           | ..   | ..                           | 77     | 79.5           | .76        | S. W. lt.    | Cumuli-strati.    | .76                          | 79.5 | 77             | 79.5       | S. W. lt.    | Cumuli-strati.    | v  |   |
| 77           | 79.5   | 29.68                        | ..            | ..             | ..         | ..           | ..   | ..                           | 77     | 83             | .78        | Ditto        | Ditto             | .78                          | 83   | 77             | 83         | Ditto        | Ditto             | .. | w |
| 78.5         | 83     | 29.714                       | ..            | Cumuli.        | ..         | ..           | ..   | ..                           | 80     | 82             | .80        | ..           | Ditto             | .80                          | 82   | 80             | 82         | ..           | Ditto             | .. | x |
| 79           | 84     | 29.704                       | S. W. lt.     | Ditto          | ..         | ..           | ..   | ..                           | 79     | 81             | .80        | ..           | Ditto             | .80                          | 81   | 79             | 81         | ..           | Ditto             | .. | y |
| 79           | 83.5   | 29.72                        | Ditto         | Ditto          | ..         | ..           | ..   | ..                           | 77.5   | 79             | .76        | ..           | Ditto             | .76                          | 79   | 77.5           | 79         | ..           | Ditto             | .. |   |
| 77           | 79     | 29.72                        | Ditto         | C. cum.        | ..         | ..           | ..   | ..                           | 76     | 77             | .78        | ..           | Clear.            | .78                          | 77   | 76             | 77         | ..           | Clear.            | .. |   |
| 2146.5       | 2460.5 | 802.356                      | ...           | ..             | ..         | 627          | 747  | 267.85                       | 1934.5 | 2032           | 744.39     | ..           | ..                | 1934.5                       | 2032 | 744.39         | 744.39     | ..           | ..                | .. |   |
| 79.5         | 91.130 | 29.717                       | ...           | ..             | ..         | 78.4         | 83   | 29.761                       | 77.38  | 8128           | 29.774     | ..           | ..                | 77.38                        | 8128 | 29.774         | 29.774     | ..           | ..                | .. |   |

*Meteorological Remarks for the month of May, 1853.*

- 
- a* Cool fresh air from W. N. W.
  - b* Lt. fleecy clouds.
  - c* Cool fresh air.
  - d* Cool fresh light, almost calm.
  - e* Cool breeze.
  - f* Sky free from clouds.
  - g* Strong breeze.
  - h* Scattered cumuli.
  - i* Wind variable.
  - j* No rain to-day.
  - k* Light breeze.
  - l* Close and sultry.
  - m* 1.8 Fell last night during above 1 hour and a half.
  - n* Heavy rain. Rain just ceased fallen for 4 hours.
  - o* Rain just ceased, fair.
  - p* Dense clouds. Fair and less clouds.
  - q* Fine but close. Close and sultry scattered cumuli.
  - r* Very sultry, fine breeze, cumuli and light air.
  - s* Hazy, scattered cumuli.
  - t* Ditto.
  - u* Ditto.
  - v* Dense clouds—rain.
  - w* Fine morning, light air.
  - x* Heavy rain after mid-night, rain.
  - y* Fine breez.
- 

The weather this month has been unsettled, cloudy and frequently wet.

Squalls of wind and rain with lightning at sunset and during the nights.

Prevailing winds in the early part of the month in the morning W. N. W. S. W. and W. S. W. in the afternoons. Latterly prevailing throughout the 24 hours in the S. W.

Up to sunrise of 1st June .04 inches of rain have fallen.

The Barometer is by J. Newman 122, Regent St. London.

Cap. action + .046.

Capacities 1-58.

Temp. 32° Farh.

Neut. point 29532.

Height of Mercury from the ground six feet.

*Rangoon, 9th July, 1853.*

*Meteorological Observations kept at Rangoon.*

(5)

| Thermometer<br>Sunrise. | Thermometer<br>9 A. M.                              | Thermometer<br>Noon.                                | Thermometer<br>3 P. M.                              | Thermometer<br>Sunset.                              | Thermometer<br>9 P. M.                               | Remarks.                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bulbs.                  | Maximum.<br>83                                      | Minimum.<br>75.5                                    | Maximum.<br>82                                      | Minimum.<br>76.5                                    | Maximum.<br>82                                       | Prevailing winds this month South and S. W. cloudy weather with fresh breezes and frequent rain. 15.01 inches fell on 26 days.<br>The heaviest falls were on the 3d, 7th, 15th, 24th, and 30th of the month. |
|                         | Min. of pre-<br>ceding ob-<br>servations.<br>78.278 | Min. of pre-<br>ceding ob-<br>servations.<br>76.963 | Min. of pre-<br>ceding ob-<br>servations.<br>74.5   | Min. of pre-<br>ceding ob-<br>servations.<br>77.125 | Min. of pre-<br>ceding ob-<br>servations.<br>77.932  |                                                                                                                                                                                                              |
| Wet....                 |                                                     |                                                     |                                                     |                                                     |                                                      |                                                                                                                                                                                                              |
| Dry....                 |                                                     |                                                     |                                                     |                                                     |                                                      |                                                                                                                                                                                                              |
| Barometer<br>Sunrise.   | Maximum.<br>29.85                                   | Minimum.<br>29.61                                   | Min. of pre-<br>ceding ob-<br>servations.<br>29.748 | Maximum.<br>29.89                                   | Barometer<br>9 A. M.                                 |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Maximum.<br>29.66                                    |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Minimum.<br>29.791                                   |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Maxim.                                               |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Barometer<br>Noon.                                   |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Maximum.<br>29.814                                   |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Minimum.<br>29.726                                   |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Min. of pre-<br>ceding ob-<br>servations.<br>29.749  |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Barometer<br>3 P. M.                                 |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Maximum.<br>29.81                                    |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Minimum.<br>29.55                                    |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Min. of pre-<br>ceding ob-<br>servations.<br>29.7075 |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Barometer<br>Sunset.                                 |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Maximum.<br>29.84                                    |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Minimum.<br>29.61                                    |                                                                                                                                                                                                              |
|                         |                                                     |                                                     |                                                     |                                                     | Min. of pre-<br>ceding ob-<br>servations.<br>29.749  |                                                                                                                                                                                                              |

**J. FAYRER, M. D. Asst. Surgeon,  
Field Hospital, Rangoon.**



*Meteorological Observations for the month of June, 1853.*

(6)  
*Rangoon, 1st July, 1853.*

| Date.  | SUNRISE. |        |           |               | Force and direction of Wind. | Aspect of Sky. | Rain.  | Thermometer. |        | Force and direction of Wind. | Aspect of Sky. | Thermometer.  |         | Force and direction of Wind. | Aspect of Sky. |      |               |
|--------|----------|--------|-----------|---------------|------------------------------|----------------|--------|--------------|--------|------------------------------|----------------|---------------|---------|------------------------------|----------------|------|---------------|
|        | Wet.     | Dry.   | Mer. Bar. | Mer. Cential. |                              |                |        | Wet.         | Dry.   |                              |                | Mer. Cential. | Wet.    |                              |                | Dry. | Mer. Cential. |
|        |          |        |           |               |                              |                |        |              |        |                              |                |               |         |                              |                |      |               |
| 1      | 77       | 78     | 29.81     | Cirro-strati. | S. W. lt.                    | 0.80           | 80.5   | 83           | 29.848 | S. W. lt.                    | Cum. strati.   | 79            | 80.5    | 29.804                       | Cumuli.        |      |               |
| 2      | 78       | 79     | 29.76     | ....          | ....                         | 0.22           | 80     | 82           | 29.806 | ....                         | ....           | 79            | 80      | 29.756                       | Strati.        |      |               |
| 3      | 76.5     | 77     | 29.67     | Cirro-strati. | ....                         | 1.04           | 79     | 81           | 29.73  | ....                         | ....           | 80.5          | 85      | 29.680                       | ....           |      |               |
| 4      | 76.5     | 77     | 29.60     | Cirro-strati. | ....                         | 0.35           | 77     | 79           | 29.66  | ....                         | ....           | 79.5          | 86      | 29.64                        | Cumuli.        |      |               |
| 5      | 79       | 80.5   | 29.61     | Cum. strati.  | S. W. lt.                    | 0.25           | 81     | 85           | 29.68  | S. by W. lt.                 | Cum. strati.   | 79            | 81      | 29.64                        | Cum. strati.   |      |               |
| 6      | 77       | 78.5   | 29.65     | Strati.       | Ditto                        | 0.94           | 78     | 81           | 29.682 | ....                         | ....           | 81.5          | 83      | 29.68                        | ....           |      |               |
| 7      | 77       | 78.5   | 29.72     | ....          | ....                         | 0.96           | 78     | 80           | 29.78  | W. N. W.                     | Strati.        | 77            | 78      | 29.77                        | Strati.        |      |               |
| 8      | 77       | 78     | 29.78     | ....          | ....                         | 0.80           | 79.5   | 80           | 29.824 | W. S. W. lt.                 | ....           | 81            | 83      | 29.83                        | ....           |      |               |
| 9      | ..       | ..     | ..        | ....          | ....                         | 0.35           | 79     | 80           | 29.80  | ....                         | ....           | 81            | 84      | 29.78                        | ....           |      |               |
| 10     | 78.5     | 80     | 29.72     | ....          | Cloudy.                      | 0.10           | 80     | 82.5         | 29.78  | ....                         | ....           | 81            | 85      | 29.738                       | ....           |      |               |
| 11     | 80       | 80.5   | 29.76     | Caln.         | ....                         | 0.05           | 81.5   | 85           | 29.79  | ....                         | ....           | 81            | 89.5    | 29.77                        | Cumuli.        |      |               |
| 12     | 81       | 83     | 29.83     | Cirro-Cum.    | Hazy.                        | 0.00           | 82     | 85           | 29.86  | ....                         | Cumuli.        | 81.5          | 82      | 29.83                        | Cum. strati.   |      |               |
| 13     | 77       | 77     | 29.81     | S. W. lt.     | Strati.                      | 0.55           | 79.5   | 79.5         | 29.89  | ....                         | Cirro-strati.  | 80.5          | 82.5    | 29.84                        | ....           |      |               |
| 14     | ..       | ..     | 29.78     | Cumuli.       | ....                         | 0.00           | 78     | 81           | 29.84  | ....                         | ....           | 80            | 82      | 29.79                        | ....           |      |               |
| 15     | 78       | 80     | 29.78     | ....          | ....                         | 0.10           | 80     | 82           | 29.84  | ....                         | ....           | 81.5          | 88      | 29.73                        | Cumuli         |      |               |
| 16     | 78.5     | 80     | 29.78     | ....          | ....                         | 0.60           | 79     | 82           | 29.83  | ....                         | ....           | 80.5          | 85.5    | 29.82                        | ....           |      |               |
| 17     | 77       | 78     | 29.78     | ....          | ....                         | 0.10           | 78     | 79           | 29.78  | ....                         | ....           | 79.5          | 82.5    | 29.74                        | Strati.        |      |               |
| 18     | 77.5     | 79.5   | 29.78     | S. E. lt.     | Cirro-st.                    | 0.30           | 78     | 80.5         | 29.80  | Steady.                      | Strati.        | 80.5          | 84.5    | 29.814                       | Ditto          |      |               |
| 19     | 76.5     | 78     | 29.84     | ....          | ....                         | 1.75           | 77.5   | 79           | 29.86  | ....                         | Strati.        | 79.1          | 84      | 29.83                        | Cum. strati.   |      |               |
| 20     | 75       | 76     | 29.85     | S. W. lt.     | Rain.                        | 0.45           | 77.5   | 79           | 29.88  | ....                         | Cumuli.        | 80.5          | 87      | 29.82                        | ....           |      |               |
| 21     | 79       | 80     | 29.81     | ....          | ....                         | 0.32           | 80     | 83           | 29.84  | ....                         | ....           | ..            | 85      | 29.81                        | ....           |      |               |
| 22     | 75       | 78     | 29.78     | ....          | ....                         | 0.00           | 79     | 82           | 29.82  | ....                         | ....           | 80            | 84      | 29.78                        | ....           |      |               |
| 23     | 78       | 79     | 29.76     | ....          | ....                         | 0.90           | 79     | 81           | 29.81  | ....                         | ....           | 76            | 77.5    | 29.77                        | ....           |      |               |
| 24     | 74       | 76     | 29.72     | ....          | ....                         | 1.20           | 77     | 80           | 29.78  | W. N. W.                     | Cumuli.        | 78            | 83      | 29.68                        | ....           |      |               |
| 25     | 75       | 77     | 29.69     | S. W. lt.     | Cumuli.                      | 0.12           | 77     | 81           | 29.72  | ....                         | Ditto          | 78            | 84      | 29.73                        | Cumuli.        |      |               |
| 26     | *        | 76     | 29.77     | ....          | ....                         | 0.00           | 78     | 81.5         | 29.74  | ....                         | ....           | 78            | 84      | 29.68                        | ....           |      |               |
| 27     | 75       | 76     | 29.77     | S. W. lt.     | ....                         | 0.50           | 75     | 77           | 29.78  | ....                         | Cirri.         | 78            | 82      | 29.76                        | ....           |      |               |
| 28     | 75.5     | 78     | 29.70     | ....          | ....                         | 0.10           | 77.5   | 80.5         | 29.74  | ....                         | Strati.        | ..            | ..      | ..                           | Strati.        |      |               |
| 29     | 74.5     | 75.5   | 29.67     | ....          | Cum. st.                     | 0.54           | ..     | ..           | ..     | ....                         | ....           | ..            | ..      | ..                           | Ditto          |      |               |
| 30     | 75       | 75.5   | 29.72     | ....          | ....                         | 1.62           | 75.5   | 76.5         | 29.77  | S. W. lt.                    | Strati.        | 80            | 82.5    | 29.77                        | Ditto          |      |               |
| Total. | 1978     | 2113.5 | 832.93    | ....          | ....                         | 15.01          | 22.81  | 234.5        | 863.94 | ....                         | ....           | 21.56         | 22.51   | 802.602                      | ....           |      |               |
| Mean.  | 76.963   | 78.278 | 29.748    | ....          | ....                         | 50.034         | 78.655 | 80.862       | 29.791 | ....                         | ....           | 79.8619       | 83.3704 | 29.726                       | ....           |      |               |

\* No observations.

*Meteorological Observations for the month of June, 1853—(Continued.)*

(7)

| 3 P. M.      |        |                              |                | SUNSET.      |      |            |                              | 9 P. M.        |              |         |            |                              |                |                          |
|--------------|--------|------------------------------|----------------|--------------|------|------------|------------------------------|----------------|--------------|---------|------------|------------------------------|----------------|--------------------------|
| Thermometer. |        | Force and direction of Wind. | Aspect of Sky. | Thermometer. |      | Mercurial. | Force and direction of Wind. | Aspect of Sky. | Thermometer. |         | Mercurial. | Force and direction of Wind. | Aspect of Sky. | Remarks.                 |
| Wet.         | Dry.   |                              |                | Wet.         | Dry. |            |                              |                | Wet.         | Dry.    |            |                              |                |                          |
| 79.5         | 81.5   | S. W. lt.                    | Cum. st.       | ..           | ..   | ..         | ..                           | ..             | 79.5         | 80      | 29.81      | S. W. lt.                    | Cloudy.        | Fine morning but cldy.   |
| 80           | 84     | ....                         | ....           | ..           | ..   | ..         | ..                           | ..             | 75.5         | 77.5    | 29.74      | ....                         | Fine clr.      | Ditto.                   |
| 79           | 81.5   | ....                         | ....           | 75           | 78   | 29.61      | S. W. lt.                    | Cum. st.       | 77           | 78.5    | 29.638     | ....                         | Cirri.         | Cloudy, rain just over.  |
| 81           | 86     | ....                         | ....           | ..           | ..   | ..         | ....                         | ....           | 79           | 82      | 29.55      | ....                         | ....           | Hazy. [gan at 2 P. M.    |
| 79.5         | 83     | S. W. steady.                | ....           | ..           | ..   | ..         | ....                         | ....           | 77.5         | 79      | 29.656     | ....                         | Den. clds.     | Shower just over; be-    |
| 77           | 78.5   | Ditto lt.                    | ....           | ..           | ..   | ..         | ....                         | ....           | 79.5         | 80.5    | 29.74      | ....                         | ....           | Rain and thunder.        |
| 80           | 81.5   | ....                         | Strati.        | ..           | ..   | ..         | ....                         | ....           | 75.5         | 77      | 29.736     | ....                         | ....           | Rain.                    |
| 79.5         | 81     | Ditto lt.                    | Cumuli.        | ..           | ..   | ..         | ....                         | ....           | 77.5         | 78.5    | 29.78      | ....                         | ....           | Light rain.              |
| 81           | 85     | Do. steady.                  | ....           | ..           | ..   | ..         | ....                         | ....           | 79.5         | 81      | 29.77      | ....                         | ....           | Dense clouds, sultry.    |
| 82           | 85     | ....                         | ....           | ..           | ..   | ..         | ....                         | ....           | 81.5         | 82      | 29.76      | ....                         | ....           | Fine day, ditto.         |
| 80           | 89     | ....                         | Strati.        | ..           | ..   | ..         | S. W. lt.                    | ....           | ..           | ..      | ..         | ....                         | ....           | Light shower.            |
| 83           | 84.5   | ....                         | ....           | 78           | 79   | 29.84      | S. W. lt.                    | Strati.        | 77.5         | 77.5    | 29.80      | N. W. lt.                    | Strati.        | Fair—cloudy. [apprg.     |
| 82           | 83     | S. W. lt.                    | Cumuli.        | ..           | ..   | ..         | ....                         | ....           | 77.5         | 80      | 29.81      | Calm.                        | C.-cum.        | Fine, afternoon shower   |
| 78.5         | 81.5   | N. W. lt.                    | Ditto          | ..           | ..   | ..         | ....                         | ....           | 78           | 82      | 29.82      | ....                         | ....           | Fine morning. [day.      |
| 80.5         | 88     | S. W. lt.                    | ....           | ..           | ..   | ..         | ....                         | ....           | 79           | 82      | 29.82      | ....                         | ....           | Light shower yester.     |
| 77.5         | 81.5   | W. N. W. lt.                 | ....           | 78           | 82   | 29.76      | S. W. lt.                    | Cum. st.       | ..           | ..      | ..         | ....                         | ....           | Light rain, fair sultry. |
| 78.5         | 82.5   | S. W. f. lt.                 | ....           | ..           | ..   | ..         | ....                         | ....           | ..           | ..      | ..         | ....                         | ....           | Rain at night.           |
| 76           | 79     | S. W. f.                     | Cumuli.        | ..           | ..   | ..         | ....                         | ....           | 79           | 80.5    | 29.84      | S. W. lt.                    | Strati.        | Rain.                    |
| 79           | 81     | S. W. lt.                    | Strati.        | ..           | ..   | ..         | ....                         | ....           | ..           | ..      | ..         | ....                         | ....           | Light rain.              |
| 78           | 81     | Ditto                        | Ditto          | ..           | ..   | ..         | ....                         | ....           | ..           | 82      | 29.82      | S. W. lt.                    | Cumuli.        | Sultry.                  |
| 77           | 79     | Ditto                        | Ditto          | ..           | ..   | ..         | ....                         | ....           | 78           | 79      | 29.78      | ....                         | ....           | Fair.                    |
| ..           | ..     | ....                         | ....           | ..           | ..   | ..         | ....                         | ....           | 76           | 77      | 29.77      | ....                         | ....           | Ditto.                   |
| ..           | ..     | ....                         | ....           | ..           | ..   | ..         | ....                         | ....           | 81.5         | 80.5    | 29.72      | W. S. W. lt.                 | Clear.         | Ditto.                   |
| ..           | ..     | ....                         | ....           | ..           | ..   | ..         | ....                         | ....           | ..           | ..      | ..         | ....                         | ....           | Ditto.                   |
| 80           | 85     | S. W. lt.                    | Cumuli.        | ..           | ..   | ..         | ....                         | ....           | 76           | 77.5    | 29.73      | ....                         | Strati.        | Ditto.                   |
| 78           | 79     | ....                         | Strati.        | ..           | ..   | ..         | ....                         | ....           | 75.5         | 77      | 29.69      | ....                         | ....           | Rain.                    |
| 75.5         | 77.5   | ....                         | ....           | ..           | ..   | ..         | ....                         | ....           | 76           | 77      | 29.74      | ....                         | ....           | Fair.                    |
| 79           | 83     | ....                         | ....           | 77.5         | 81   | 29.62      | S. W. lt.                    | Cum. st.       | 78           | 80      | 29.77      | Calm.                        | Clear.         | ....                     |
| 1981.        | 2061.5 | ....                         | ..             | 308.5        | 320  | 118.83     | ....                         | ....           | 1714.5       | 1746.   | 654.47     | ....                         | ....           | .....                    |
| 79.24        | 82.46  | ....                         | ..             | 77.125       | 80   | 29.7075    | ....                         | ....           | 77.932       | 79.3632 | 29.749     | ....                         | ....           | .....                    |

*Meteorological Remarks for the month of June, 1853.*

Prevailing winds this month South and S. W. cloudy weather with fresh breezes and frequent rain 15.01 inches having fallen in 26 days.

The heaviest falls on the 3d, 7th, 15th, 24th, and 31st of the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of December, 1853.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tem-<br>perature. |      |       |
|-------|-------------------------------------------------|-------------------------|---------|---------|-------------------------------|--------------------------------|------|-------|
|       |                                                 | Max.                    | Min.    | Diff.   |                               | Max.                           | Min. | Diff. |
|       | Inches.                                         | Inches.                 | Inches. | Inches. | o                             | o                              | o    | o     |
| 1     | 29.968                                          | 30.041                  | 29.906  | 0.135   | 69.3                          | 80.2                           | 57.3 | 22.9  |
| 2     | .985                                            | .064                    | .942    | .122    | 68.9                          | 78.8                           | 57.0 | 21.8  |
| 3     | 30.022                                          | .103                    | .973    | .130    | 69.2                          | 78.3                           | 58.0 | 20.3  |
| 4     | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 5     | 29.958                                          | .027                    | .894    | .133    | 67.7                          | 78.2                           | 55.5 | 22.7  |
| 6     | .952                                            | .040                    | .876    | .164    | 67.3                          | 79.0                           | 54.8 | 24.2  |
| 7     | .966                                            | .043                    | .913    | .130    | 67.0                          | 78.6                           | 58.5 | 20.1  |
| 8     | .981                                            | .057                    | .905    | .152    | 66.4                          | 77.0                           | 54.0 | 23.0  |
| 9     | .975                                            | .043                    | .913    | .130    | 64.4                          | 74.7                           | 51.4 | 23.3  |
| 10    | 30.003                                          | .081                    | .928    | .153    | 65.9                          | 76.0                           | 51.7 | 24.3  |
| 11    | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 12    | .010                                            | .090                    | .947    | .143    | 68.3                          | 78.4                           | 56.5 | 21.9  |
| 13    | .004                                            | .089                    | .947    | .142    | 68.1                          | 78.5                           | 56.0 | 22.5  |
| 14    | .019                                            | .107                    | .957    | .150    | 68.6                          | 79.0                           | 56.6 | 22.4  |
| 15    | .025                                            | .113                    | .975    | .138    | 68.3                          | 79.0                           | 55.6 | 23.4  |
| 16    | .020                                            | .091                    | .965    | .126    | 68.4                          | 78.9                           | 56.0 | 22.9  |
| 17    | .037                                            | .113                    | .973    | .140    | 68.0                          | 79.0                           | 55.8 | 23.2  |
| 18    | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 19    | 29.993                                          | .085                    | .930    | .155    | 65.4                          | 76.4                           | 53.0 | 23.4  |
| 20    | .987                                            | .066                    | .926    | .140    | 64.5                          | 77.0                           | 51.0 | 26.0  |
| 21    | .992                                            | .069                    | .930    | .139    | 64.2                          | 76.0                           | 50.9 | 25.1  |
| 22    | 30.053                                          | .126                    | .985    | .141    | 65.0                          | 76.7                           | 50.9 | 25.8  |
| 23    | .071                                            | .158                    | 30.008  | .150    | 66.3                          | 77.0                           | 53.9 | 23.1  |
| 24    | .022                                            | .114                    | 29.943  | .171    | 66.1                          | 76.2                           | 53.8 | 22.4  |
| 25    | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 26    | .058                                            | .130                    | .995    | .135    | 67.5                          | 78.0                           | 56.0 | 22.0  |
| 27    | .126                                            | .195                    | 30.075  | .120    | 66.9                          | 78.8                           | 53.8 | 25.0  |
| 28    | .102                                            | .188                    | .025    | .163    | 67.6                          | 78.3                           | 55.5 | 22.8  |
| 29    | .062                                            | .150                    | .000    | .150    | 67.4                          | 77.2                           | 56.3 | 20.9  |
| 30    | .039                                            | .116                    | 29.997  | .119    | 66.1                          | 76.2                           | 55.3 | 20.9  |
| 31    | .048                                            | .135                    | .996    | .139    | 65.3                          | 77.4                           | 52.4 | 25.0  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of December, 1853—(Continued.)*

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 61.6                            | 7.7                 | 56.4                | 12.9                         | 0.464                            | 5.10                                             | 2.73                                                                    | 0.651                                                               |
| 2     | 61.9                            | 7.0                 | 57.3                | 11.6                         | 0.477                            | 5.26                                             | 2.48                                                                    | .680                                                                |
| 3     | 62.9                            | 6.3                 | 58.9                | 10.3                         | 0.504                            | 5.56                                             | 2.25                                                                    | .712                                                                |
| 4     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 5     | 61.7                            | 6.0                 | 57.8                | 9.9                          | 0.486                            | 5.37                                             | 2.09                                                                    | .720                                                                |
| 6     | 60.8                            | 6.5                 | 56.4                | 10.9                         | 0.463                            | 5.12                                             | 2.25                                                                    | .695                                                                |
| 7     | 59.9                            | 7.1                 | 54.8                | 12.2                         | 0.440                            | 4.86                                             | 2.44                                                                    | .666                                                                |
| 8     | 59.2                            | 7.2                 | 54.0                | 12.4                         | 0.427                            | 4.74                                             | 2.43                                                                    | .661                                                                |
| 9     | 57.9                            | 6.5                 | 53.0                | 11.4                         | 0.414                            | 4.61                                             | 2.13                                                                    | .684                                                                |
| 10    | 60.2                            | 5.7                 | 56.3                | 9.6                          | 0.462                            | 5.13                                             | 1.93                                                                    | .727                                                                |
| 11    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 12    | 63.1                            | 5.2                 | 59.9                | 8.4                          | 0.521                            | 5.76                                             | 1.84                                                                    | .758                                                                |
| 13    | 63.3                            | 4.8                 | 60.4                | 7.7                          | 0.529                            | 5.85                                             | 1.70                                                                    | .775                                                                |
| 14    | 63.1                            | 5.5                 | 59.7                | 8.9                          | 0.517                            | 5.72                                             | 1.95                                                                    | .746                                                                |
| 15    | 62.7                            | 5.6                 | 59.1                | 9.2                          | 0.508                            | 5.61                                             | 1.99                                                                    | .738                                                                |
| 16    | 62.5                            | 5.9                 | 58.7                | 9.7                          | 0.501                            | 5.53                                             | 2.09                                                                    | .726                                                                |
| 17    | 60.9                            | 7.1                 | 56.0                | 12.0                         | 0.458                            | 5.06                                             | 2.47                                                                    | .672                                                                |
| 18    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 19    | 58.1                            | 7.3                 | 52.6                | 12.8                         | 0.408                            | 4.53                                             | 2.42                                                                    | .652                                                                |
| 20    | 57.4                            | 7.1                 | 52.0                | 12.5                         | 0.399                            | 4.44                                             | 2.32                                                                    | .657                                                                |
| 21    | 56.9                            | 7.3                 | 51.2                | 13.0                         | 0.389                            | 4.33                                             | 2.36                                                                    | .647                                                                |
| 22    | 58.2                            | 6.8                 | 53.1                | 11.9                         | 0.415                            | 4.62                                             | 2.25                                                                    | .672                                                                |
| 23    | 60.3                            | 6.0                 | 56.2                | 10.1                         | 0.460                            | 5.11                                             | 2.04                                                                    | .715                                                                |
| 24    | 60.3                            | 5.8                 | 56.3                | 9.8                          | 0.462                            | 5.13                                             | 1.97                                                                    | .723                                                                |
| 25    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 26    | 61.2                            | 6.3                 | 56.9                | 10.6                         | 0.472                            | 5.20                                             | 2.22                                                                    | .701                                                                |
| 27    | 60.8                            | 6.1                 | 56.6                | 10.3                         | 0.467                            | 5.17                                             | 2.11                                                                    | .710                                                                |
| 28    | 61.6                            | 6.0                 | 57.7                | 9.9                          | 0.484                            | 5.35                                             | 2.09                                                                    | .719                                                                |
| 29    | 60.8                            | 6.6                 | 56.3                | 11.1                         | 0.462                            | 5.11                                             | 2.28                                                                    | .691                                                                |
| 30    | 59.3                            | 6.8                 | 54.4                | 11.7                         | 0.434                            | 4.80                                             | 2.30                                                                    | .676                                                                |
| 31    | 58.3                            | 7.0                 | 53.0                | 12.3                         | 0.414                            | 4.60                                             | 2.33                                                                    | .664                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of December, 1853—(Continued.)*

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                     |
|-------|-----------------------|-------|-----------------------------------|------------------------------------------------|
|       | 0                     | Inc.  |                                   |                                                |
| 1     | 94.0                  | ..    | W. or N. W. or N.                 | Cloudless.                                     |
| 2     | 94.5                  | ..    | N. or N. W.                       | Ditto.                                         |
| 3     | 94.0                  | ..    | N. N. W. or N. W.                 | Ditto.                                         |
| 4     | <i>Sunday.</i>        |       |                                   |                                                |
| 5     | 93.5                  | ..    | N. W.                             | Cloudless.                                     |
| 6     | 92.0                  | ..    | N. W. or Calm.                    | Ditto.                                         |
| 7     | 98.5                  | ..    | N. W.                             | Ditto.                                         |
| 8     | 86.0                  | ..    | Calm or N. W.                     | Ditto.                                         |
| 9     | 91.0                  | ..    | N. W.                             | Ditto.                                         |
| 10    | 96.2                  | ..    | Ditto.                            | Cloudy till 6 A. M. cloudless afterwards.      |
| 11    | <i>Sunday.</i>        |       |                                   |                                                |
| 12    | 95.9                  | ..    | Calm or N. W.                     | Cloudless.                                     |
| 13    | 93.6                  | ..    | N. N. W. or N. W.                 | Ditto.                                         |
| 14    | 98.0                  | ..    | N. W.                             | Ditto.                                         |
| 15    | 89.8                  | ..    | Ditto.                            | Ditto.                                         |
| 16    | 97.0                  | ..    | Calm or N. W.                     | Cloudless till 4 A. M. scattered \i till       |
| 17    | 90.0                  | ..    | N. or N. W.                       | 10 A. M. cloudless afterwards.                 |
|       |                       |       |                                   | Cloudless.                                     |
| 18    | <i>Sunday</i>         |       |                                   |                                                |
| 19    | 89.6                  | ..    | N. W.                             | Cloudless.                                     |
| 20    | 88.0                  | ..    | Calm or W. or N.                  | Ditto.                                         |
| 21    | 92.0                  | ..    | N. W. or N.                       | Ditto.                                         |
| 22    | 98.6                  | ..    | N. or N. W.                       | Ditto.                                         |
| 23    | ....                  | ..    | Ditto.                            | Ditto.                                         |
| 24    | ....                  | ..    | N. W.                             | Ditto.                                         |
| 25    | <i>Sunday.</i>        |       |                                   |                                                |
| 26    | ....                  | ..    | Calm or N. W. or N.               | Cloudless till 6 A. M. scattered \i or \i till |
|       |                       |       |                                   | 6 P. M. cloudless afterwards.                  |
| 27    | ....                  | ..    | W. or N. W.                       | Cloudless till 6 A. M. scattered \i till       |
|       |                       |       |                                   | 5 P. M. cloudless afterwards.                  |
| 28    | ....                  | ..    | N. W. or W. or calm.              | Cloudless till 7 A. M. scattered \i till       |
|       |                       |       |                                   | 5 P. M. cloudless afterwards.                  |
| 29    | ....                  | ..    | N. W. or W.                       | Cloudless.                                     |
| 30    | ....                  | ..    | Calm or N. W.                     | Ditto.                                         |
| 31    | ....                  | ..    | Ditto.                            | Ditto.                                         |

Symbols, ..... { \i Cirri.  
 \i Cirro-strati.  
 ^i Cumuli.  
 ^i Cumulo-strati.  
 \i Nimbi.  
 —i Strati.  
 \i Cirro-cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 2     | 30.019                                          | 30.106                                    | 29.977  | 0.129   | 65.0                          | 77.2                                          | 55.6 | 21.6  |
| 3     | 29.998                                          | .074                                      | .945    | .129    | 66.6                          | 77.7                                          | 58.5 | 19.2  |
| 4     | .988                                            | .052                                      | .934    | .118    | 67.7                          | 78.0                                          | 60.3 | 17.7  |
| 5     | 30.049                                          | .141                                      | 30.004  | .137    | 67.6                          | 77.8                                          | 59.6 | 18.2  |
| 6     | .058                                            | .143                                      | 29.988  | .155    | 68.5                          | 79.9                                          | 60.2 | 19.7  |
| 7     | .034                                            | .118                                      | .967    | .151    | 68.7                          | 80.0                                          | 60.0 | 20.0  |
| 8     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 9     | .051                                            | .126                                      | .994    | .132    | 67.8                          | 78.2                                          | 59.2 | 19.0  |
| 10    | .100                                            | .177                                      | 30.047  | .130    | 65.8                          | 76.4                                          | 57.0 | 19.4  |
| 11    | .078                                            | .178                                      | .017    | .161    | 64.7                          | 76.6                                          | 54.2 | 22.4  |
| 12    | .031                                            | .108                                      | 29.957  | .151    | 64.0                          | 75.8                                          | 55.0 | 20.8  |
| 13    | .052                                            | .103                                      | .998    | .105    | 65.6                          | 77.4                                          | 55.4 | 22.0  |
| 14    | .080                                            | .170                                      | 30.035  | .135    | 66.9                          | 78.7                                          | 57.4 | 21.3  |
| 15    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 16    | .038                                            | .119                                      | 29.985  | .134    | 66.6                          | 78.4                                          | 56.5 | 21.9  |
| 17    | .025                                            | .112                                      | .965    | .147    | 65.8                          | 77.7                                          | 56.3 | 21.4  |
| 18    | .000                                            | .078                                      | .934    | .144    | 64.8                          | 77.8                                          | 54.6 | 23.2  |
| 19    | 29.992                                          | .078                                      | .924    | .154    | 64.4                          | 77.7                                          | 54.4 | 23.3  |
| 20    | .999                                            | .085                                      | .929    | .156    | 65.2                          | 78.4                                          | 54.2 | 24.2  |
| 21    | .993                                            | .072                                      | .920    | .152    | 65.7                          | 78.8                                          | 55.3 | 23.5  |
| 22    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 23    | 30.025                                          | .121                                      | .965    | .156    | 66.4                          | 78.7                                          | 56.1 | 22.6  |
| 24    | .023                                            | .120                                      | .958    | .162    | 66.8                          | 79.0                                          | 56.4 | 22.6  |
| 25    | .005                                            | .095                                      | .938    | .157    | 67.5                          | 79.8                                          | 57.0 | 22.8  |
| 26    | 29.995                                          | .072                                      | .929    | .143    | 69.1                          | 80.6                                          | 60.0 | 20.6  |
| 27    | 30.031                                          | .111                                      | .970    | .141    | 71.1                          | 82.4                                          | 63.0 | 19.4  |
| 28    | .011                                            | .101                                      | .943    | .158    | 71.3                          | 82.8                                          | 61.8 | 21.0  |
| 29    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 30    | 29.936                                          | .016                                      | .879    | .137    | 71.7                          | 82.5                                          | 63.4 | 19.1  |
| 31    | .945                                            | .019                                      | .884    | .135    | 72.0                          | 83.6                                          | 64.4 | 19.2  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                    |
| 1     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 2     | 61.5                            | 3.5                 | 59.4                | 5.7                          | .517                             | 5.74                                             | 1.28                                                                    | .835                                                               |
| 3     | 62.6                            | 4.0                 | 60.3                | 6.3                          | .532                             | 5.89                                             | 1.46                                                                    | .816                                                               |
| 4     | 63.8                            | 3.9                 | 61.7                | 6.0                          | .554                             | 6.12                                             | 1.44                                                                    | .826                                                               |
| 5     | 63.0                            | 4.6                 | 60.5                | 7.1                          | .532                             | 5.88                                             | 1.66                                                                    | .798                                                               |
| 6     | 64.2                            | 4.3                 | 61.8                | 6.8                          | .558                             | 6.15                                             | 1.62                                                                    | .807                                                               |
| 7     | 64.7                            | 4.0                 | 62.4                | 6.2                          | .570                             | 6.28                                             | 1.53                                                                    | .822                                                               |
| 8     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 9     | 63.2                            | 4.6                 | 60.6                | 7.1                          | .536                             | 5.92                                             | 1.69                                                                    | .803                                                               |
| 10    | 61.4                            | 4.4                 | 58.9                | 6.9                          | .506                             | 5.61                                             | 1.55                                                                    | .808                                                               |
| 11    | 59.7                            | 5.0                 | 56.8                | 8.0                          | .471                             | 5.23                                             | 1.73                                                                    | .780                                                               |
| 12    | 59.4                            | 4.7                 | 56.6                | 7.5                          | .468                             | 5.21                                             | 1.59                                                                    | .790                                                               |
| 13    | 61.5                            | 4.0                 | 59.2                | 6.4                          | .513                             | 5.69                                             | 1.46                                                                    | .818                                                               |
| 14    | 62.3                            | 4.6                 | 59.8                | 7.1                          | .521                             | 5.76                                             | 1.67                                                                    | .801                                                               |
| 15    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 16    | 61.2                            | 5.4                 | 58.1                | 8.4                          | .494                             | 5.47                                             | 1.90                                                                    | .768                                                               |
| 17    | 60.7                            | 5.1                 | 57.7                | 8.1                          | .486                             | 5.39                                             | 1.79                                                                    | .778                                                               |
| 18    | 60.3                            | 4.5                 | 57.6                | 7.2                          | .487                             | 5.40                                             | 1.60                                                                    | .796                                                               |
| 19    | 59.2                            | 5.2                 | 56.1                | 8.3                          | .460                             | 5.12                                             | 1.78                                                                    | .774                                                               |
| 20    | 59.5                            | 5.7                 | 56.2                | 9.0                          | .463                             | 5.13                                             | 1.98                                                                    | .754                                                               |
| 21    | 60.1                            | 5.6                 | 56.9                | 8.8                          | .474                             | 5.25                                             | 1.96                                                                    | .762                                                               |
| 22    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 23    | 61.7                            | 4.7                 | 59.0                | 7.4                          | .508                             | 5.63                                             | 1.71                                                                    | .797                                                               |
| 24    | 62.4                            | 4.4                 | 59.9                | 6.9                          | .525                             | 5.80                                             | 1.64                                                                    | .806                                                               |
| 25    | 63.0                            | 4.4                 | 60.6                | 6.9                          | .537                             | 5.92                                             | 1.68                                                                    | .805                                                               |
| 26    | 64.9                            | 4.2                 | 62.6                | 6.5                          | .573                             | 6.30                                             | 1.65                                                                    | .816                                                               |
| 27    | 67.0                            | 4.1                 | 64.8                | 6.3                          | .615                             | 6.74                                             | 1.69                                                                    | .823                                                               |
| 28    | 66.4                            | 4.9                 | 63.8                | 7.4                          | .596                             | 6.53                                             | 1.96                                                                    | .796                                                               |
| 29    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 30    | 68.5                            | 3.3                 | 66.8                | 5.0                          | .657                             | 7.20                                             | 1.38                                                                    | .858                                                               |
| 31    | 68.9                            | 3.2                 | 67.2                | 4.8                          | .666                             | 7.30                                             | 1.38                                                                    | .866                                                               |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Falt. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 30.020                                    | 30.092                                                 | 29.926  | 0.166   | 62.5                       | 68.2                                                     | 58.7 | 9.5   |
| 1          | .016                                      | .092                                                   | .928    | .164    | 61.5                       | 67.3                                                     | 57.6 | 9.7   |
| 2          | .007                                      | .078                                                   | .917    | .161    | 60.8                       | 66.8                                                     | 56.9 | 9.9   |
| 3          | .000                                      | .075                                                   | .912    | .163    | 60.3                       | 66.0                                                     | 56.9 | 9.1   |
| 4          | 29.997                                    | .076                                                   | .913    | .163    | 59.7                       | 65.5                                                     | 56.1 | 9.4   |
| 5          | 30.004                                    | .084                                                   | .921    | .163    | 59.1                       | 65.2                                                     | 55.1 | 10.1  |
| 6          | .021                                      | .102                                                   | .939    | .163    | 58.5                       | 64.4                                                     | 54.8 | 9.6   |
| 7          | .047                                      | .125                                                   | .959    | .166    | 58.0                       | 65.0                                                     | 54.2 | 10.8  |
| 8          | .076                                      | .152                                                   | .985    | .167    | 60.4                       | 64.8                                                     | 56.7 | 8.1   |
| 9          | .099                                      | .177                                                   | 30.005  | .172    | 65.0                       | 69.1                                                     | 60.9 | 8.2   |
| 10         | .102                                      | .178                                                   | .016    | .162    | 69.3                       | 73.4                                                     | 64.8 | 8.6   |
| 11         | .084                                      | .171                                                   | 29.991  | .180    | 72.4                       | 76.6                                                     | 67.8 | 8.8   |
| Noon.      | .050                                      | .126                                                   | .970    | .156    | 75.4                       | 80.4                                                     | 71.7 | 8.7   |
| 1          | .014                                      | .092                                                   | .934    | .158    | 77.6                       | 82.0                                                     | 74.4 | 7.6   |
| 2          | 29.987                                    | .070                                                   | .907    | .163    | 78.4                       | 83.4                                                     | 75.2 | 8.2   |
| 3          | .971                                      | .051                                                   | .887    | .164    | 78.8                       | 83.6                                                     | 75.8 | 7.8   |
| 4          | .963                                      | .047                                                   | .879    | .168    | 76.7                       | 81.8                                                     | 73.8 | 8.0   |
| 5          | .970                                      | .052                                                   | .881    | .171    | 75.0                       | 80.1                                                     | 72.2 | 7.9   |
| 6          | .980                                      | .058                                                   | .892    | .166    | 71.8                       | 76.8                                                     | 69.0 | 7.8   |
| 7          | .998                                      | .077                                                   | .913    | .164    | 69.4                       | 74.0                                                     | 66.2 | 7.8   |
| 8          | 30.016                                    | .098                                                   | .925    | .173    | 67.5                       | 72.0                                                     | 64.2 | 7.8   |
| 9          | .028                                      | .109                                                   | .944    | .165    | 66.0                       | 70.8                                                     | 62.3 | 8.5   |
| 10         | .034                                      | .113                                                   | .953    | .160    | 64.7                       | 69.7                                                     | 61.3 | 8.4   |
| 11         | .031                                      | .105                                                   | .930    | .175    | 63.7                       | 69.9                                                     | 60.1 | 9.8   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta in the  
month of January, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 60.6                            | 1.9                 | 59.3                | 3.2                          | 0.513                            | 5.73                                             | 0.65                                                                    | 0.898                                                               |
| 1              | 59.6                            | 1.8                 | 58.2                | 3.3                          | .495                             | .54                                              | .63                                                                     | .898                                                                |
| 2              | 59.1                            | 1.7                 | 57.7                | 3.1                          | .488                             | .46                                              | .58                                                                     | .903                                                                |
| 3              | 58.5                            | 1.8                 | 57.1                | 3.2                          | .477                             | .35                                              | .60                                                                     | .899                                                                |
| 4              | 58.0                            | 1.7                 | 56.6                | 3.1                          | .470                             | .27                                              | .56                                                                     | .903                                                                |
| 5              | 57.5                            | 1.6                 | 56.1                | 2.9                          | .463                             | .24                                              | .52                                                                     | .908                                                                |
| 6              | 57.0                            | 1.5                 | 55.6                | 2.8                          | .455                             | .12                                              | .50                                                                     | .910                                                                |
| 7              | 56.7                            | 1.3                 | 55.5                | 2.5                          | .453                             | .10                                              | .43                                                                     | .920                                                                |
| 8              | 58.4                            | 2.0                 | 56.9                | 3.5                          | .474                             | .32                                              | .64                                                                     | .890                                                                |
| 9              | 61.6                            | 3.4                 | 59.4                | 5.6                          | .516                             | .73                                              | 1.15                                                                    | .832                                                                |
| 10             | 64.0                            | 5.4                 | 61.1                | 8.2                          | .547                             | 6.02                                             | 1.83                                                                    | .764                                                                |
| 11             | 65.5                            | 6.8                 | 62.1                | 10.3                         | .567                             | .17                                              | 2.44                                                                    | .715                                                                |
| Noon.          | 66.9                            | 8.5                 | 62.6                | 12.8                         | .574                             | .25                                              | 3.20                                                                    | .660                                                                |
| 1              | 67.9                            | 9.6                 | 63.1                | 14.5                         | .584                             | .32                                              | 3.76                                                                    | .626                                                                |
| 2              | 68.0                            | 10.4                | 62.8                | 15.6                         | .577                             | .24                                              | 4.10                                                                    | .603                                                                |
| 3              | 68.3                            | 10.5                | 63.1                | 15.8                         | .583                             | .29                                              | 4.17                                                                    | .601                                                                |
| 4              | 67.2                            | 9.6                 | 62.4                | 14.4                         | .569                             | .18                                              | 3.66                                                                    | .627                                                                |
| 5              | 67.3                            | 7.7                 | 63.4                | 11.6                         | .589                             | .41                                              | 2.92                                                                    | .688                                                                |
| 6              | 66.8                            | 5.0                 | 64.2                | 7.6                          | .604                             | .62                                              | 1.85                                                                    | .781                                                                |
| 7              | 65.4                            | 4.0                 | 63.2                | 6.2                          | .585                             | .44                                              | 1.44                                                                    | .817                                                                |
| 8              | 64.3                            | 3.3                 | 62.3                | 5.2                          | .568                             | .28                                              | 1.17                                                                    | .843                                                                |
| 9              | 63.1                            | 2.9                 | 61.3                | 4.7                          | .549                             | .08                                              | 1.01                                                                    | .857                                                                |
| 10             | 62.2                            | 2.6                 | 60.5                | 4.2                          | .535                             | 5.94                                             | 0.89                                                                    | .870                                                                |
| 11             | 61.5                            | 2.3                 | 59.9                | 3.8                          | .524                             | .84                                              | .78                                                                     | .882                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Solar radiation. Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                       |
|-------|-----------------------|-------|-----------------------------------|--------------------------------------------------------------------------------------------------|
|       | o                     | Inc.  |                                   |                                                                                                  |
| 1     | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 2     | 130.1                 | ..    | N. W. or W.                       | Cloudless.                                                                                       |
| 3     | 128.0                 | ..    | N. W.                             | Cloudless till 3 A. M. scattered \i and \i till 7 P. M. cloudless afterwards.                    |
| 4     | 126.2                 | ..    | Calm or N. W.                     | Ditto 4 A. M. ditto ditto 5 P. M. ditto.                                                         |
| 5     | 129.8                 | ..    | N. N. W. or N. W.                 | Nearly cloudless the whole day.                                                                  |
| 6     | 130.5                 | ..    | N. N. W. or N. W.                 | Cloudless.                                                                                       |
| 7     | 131.0                 | ..    | N. W. or W.                       | Cloudless till 6 A. M. scattered \i till 6 P. M. cloudless afterwards.                           |
| 8     | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 9     | 133.4                 | ..    | N. or N. N. W.                    | Cloudless nearly the whole day. [wards.                                                          |
| 10    | 130.0                 | ..    | N. W. or W.                       | Cloudless till 11 P. M. scattered \i after-                                                      |
| 11    | 130.4                 | ..    | W. or N. W.                       | Cloudless till 8 A. M. scattered \i till 5 P. M. scattered \i till 8 P. M. cloudless afterwards. |
| 12    | 127.0                 | ..    | Ditto.                            | Cloudless till 6 A. M. scattered \i or \i or \i till 4 P. M. cloudless afterwards.               |
| 13    | 128.0                 | ..    | W. or N.                          | Cloudless till 3 A. M. scattered \i or \i afterwards.                                            |
| 14    | 131.2                 | ..    | N. or N. W.                       | Nearly cloudless the whole day.                                                                  |
| 15    | <i>Sunday.</i>        |       |                                   | [afterwards.                                                                                     |
| 16    | 127.0                 | ..    | W. or N. W.                       | Scattered \i till 8 A. M. nearly cloudless                                                       |
| 17    | 133.0                 | ..    | N. W.                             | Cloudless.                                                                                       |
| 18    | 127.0                 | ..    | Ditto.                            | Ditto.                                                                                           |
| 19    | 130.7                 | ..    | N. W. or W.                       | Ditto.                                                                                           |
| 20    | 132.0                 | ..    | Ditto.                            | Ditto.                                                                                           |
| 21    | 134.0                 | ..    | Ditto.                            | Cloudless till 10 A. M. scattered \i or \i till 6 P. M. cloudless afterwards.                    |
| 22    | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 23    | 135.0                 | ..    | W. or N. W. or calm.              | Cloudless.                                                                                       |
| 24    | 132.0                 | ..    | Calm or N. W. or S. W.            | Cloudless till 6 A. M. scattered \i or \i till 8 P. M. cloudless afterwards.                     |
| 25    | 127.0                 | ..    | W. or S. W.                       | Ditto 5 A. M. ditto ditto 6 P. M. ditto.                                                         |
| 26    | 131.0                 | ..    | S. W.                             | Cloudless nearly the whole day.                                                                  |
| 27    | 132.0                 | ..    | S. W. or N.                       | Cloudless.                                                                                       |
| 28    | 134.0                 | ..    | S. W. or S. E.                    | Ditto.                                                                                           |
| 29    | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 30    | 135.0                 | ..    | S. E. or S.                       | Cloudless—fogs in the morning.                                                                   |
| 31    | 135.0                 | ..    | Ditto.                            | Cloudless with fogs in the morning.                                                              |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.547     | 82.3         | 84.4    | 66.5      | ..                   | ..       | N. W.                  | Clear                |
| 2     | 29.517     | 78.0         | 79.2    | 67.9      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.593     | 79.8         | 81.1    | 68.5      | ..                   | ..       | W.                     | Ditto                |
| 4     | 29.467     | 81.0         | 82.5    | 66.4      | ..                   | ..       | W.                     | Ditto                |
| 5     | 29.481     | 79.0         | 79.9    | 64.4      | ..                   | ..       | N. W.                  | Ditto                |
| 6     | 29.493     | 80.0         | 81.0    | 67.0      | ..                   | ..       | N. W.                  | Ditto                |
| 7     | 29.474     | 83.0         | 83.5    | 65.0      | ..                   | ..       | N. W.                  | Ditto                |
| 8     | 29.443     | 80.9         | 82.0    | 66.0      | ..                   | ..       | N. W.                  | Ditto                |
| 9     | 29.475     | 79.0         | 79.9    | 62.0      | ..                   | ..       | N. W.                  | Ditto                |
| 10    | 29.533     | 77.9         | 78.3    | 61.5      | ..                   | ..       | N. W.                  | Ditto                |
| 11    | 29.531     | 78.0         | 78.6    | 62.0      | ..                   | ..       | W.                     | Ditto                |
| 12    | 29.433     | 76.5         | 78.2    | 65.0      | ..                   | ..       | S. E.                  | Ditto                |
| 13    | 29.451     | 74.0         | 75.0    | 65.0      | ..                   | ..       | S. E.                  | Ditto                |
| 14    | 29.483     | 73.8         | 75.5    | 67.6      | ..                   | ..       | S. E.                  | Ditto                |
| 15    | 29.489     | 71.0         | 71.5    | 61.8      | ..                   | ..       | E.                     | Ditto                |
| 16    | 29.487     | 70.9         | 71.6    | 62.9      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.519     | 67.4         | 68.4    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| 18    | 29.591     | 67.5         | 68.6    | 57.3      | ..                   | ..       | W.                     | Ditto                |
| 19    | 29.559     | 67.0         | 69.1    | 55.5      | ..                   | ..       | W.                     | Ditto                |
| 20    | 29.593     | 68.0         | 69.5    | 56.0      | ..                   | ..       | N. W.                  | Ditto                |
| 21    | 29.571     | 69.0         | 70.0    | 56.5      | ..                   | ..       | N. W.                  | ^ scattered          |
| 22    | 29.583     | 70.1         | 71.0    | 57.0      | ..                   | ..       | W.                     | Clear                |
| 23    | 29.575     | 68.8         | 70.0    | 59.0      | ..                   | ..       | N. W.                  | ^ scattered to W.    |
| 24    | 29.533     | 68.0         | 69.0    | 59.0      | ..                   | ..       | N. W.                  | Clear                |
| 25    | 29.589     | 68.0         | 70.3    | 59.4      | ..                   | ..       | N. W.                  | Ditto                |
| 26    | 29.547     | 69.8         | 71.9    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| 27    | 29.445     | 70.5         | 71.0    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 28    | 29.513     | 70.0         | 72.6    | 59.9      | ..                   | ..       | S.                     | Ditto                |
| 29    | 29.533     | 67.0         | 68.5    | 58.0      | ..                   | ..       | N.                     | Ditto                |
| 30    | 29.601     | 64.5         | 65.5    | 54.8      | ..                   | ..       | W.                     | ^ very few in zenith |
| Mean. | 29.522     | 73.4         | 74.6    | 61.7      | ..                   | ..       | ..                     | .....                |



*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.515     | 84.5         | 85.2    | 67.2      | ..                   | ..       | N. W.                  | Clear                |
| 2     | 29.493     | 79.0         | 80.4    | 68.1      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.513     | 78.5         | 79.0    | 66.0      | ..                   | ..       | W.                     | Ditto                |
| 4     | 29.451     | 83.7         | 85.0    | 67.0      | ..                   | ..       | N. W.                  | Ditto                |
| 5     | 29.455     | 82.8         | 83.9    | 65.4      | ..                   | ..       | N. W.                  | Ditto                |
| 6     | 29.483     | 82.0         | 83.0    | 68.0      | ..                   | ..       | N. W.                  | Ditto                |
| 7     | 29.459     | 85.1         | 85.9    | 65.6      | ..                   | ..       | N. W.                  | Ditto                |
| 8     | 29.427     | 84.6         | 85.5    | 67.3      | ..                   | ..       | N. W.                  | Ditto                |
| 9     | 29.457     | 82.0         | 82.6    | 63.0      | ..                   | ..       | N. W.                  | Ditto                |
| 10    | 29.493     | 82.9         | 83.5    | 62.9      | ..                   | ..       | N. W.                  | Ditto                |
| 11    | 29.491     | 80.0         | 81.8    | 63.0      | ..                   | ..       | W.                     | Ditto                |
| 12    | 29.394     | 78.9         | 79.2    | 66.5      | ..                   | ..       | S. E.                  | Ditto                |
| 13    | 29.419     | 76.2         | 77.0    | 66.0      | ..                   | ..       | S. E.                  | Ditto                |
| 14    | 29.425     | 75.0         | 76.5    | 68.0      | ..                   | ..       | S. E.                  | Ditto                |
| 15    | 29.431     | 74.2         | 75.7    | 62.9      | ..                   | ..       | N. W.                  | Ditto                |
| 16    | 29.455     | 75.0         | 76.0    | 59.5      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.505     | 71.6         | 72.6    | 58.9      | ..                   | ..       | W.                     | Ditto                |
| 18    | 29.551     | 69.8         | 69.9    | 58.2      | ..                   | ..       | W.                     | Ditto                |
| 19    | 29.515     | 69.0         | 70.0    | 56.0      | ..                   | ..       | N. W.                  | Ditto                |
| 20    | 29.557     | 70.0         | 71.7    | 56.9      | ..                   | ..       | N. W.                  | Ditto                |
| 21    | 29.539     | 74.5         | 75.0    | 57.0      | ..                   | ..       | N. W.                  | \ scattered          |
| 22    | 29.563     | 72.8         | 73.4    | 58.6      | ..                   | ..       | W.                     | \ to E. & N.         |
| 23    | 29.529     | 73.0         | 74.2    | 60.0      | ..                   | ..       | W.                     | Clear                |
| 24    | 29.523     | 73.0         | 74.0    | 59.9      | ..                   | ..       | N. W.                  | Ditto                |
| 25    | 29.555     | 71.0         | 72.2    | 60.1      | ..                   | ..       | N. W.                  | Ditto                |
| 26    | 29.505     | 72.6         | 73.5    | 59.2      | ..                   | ..       | N. W.                  | Ditto                |
| 27    | 29.405     | 74.0         | 75.0    | 64.6      | ..                   | ..       | N. W.                  | Ditto                |
| 28    | 29.487     | 74.0         | 75.1    | 60.0      | ..                   | ..       | S.                     | \ a few to S. E.     |
| 29    | 29.497     | 73.0         | 74.1    | 59.4      | ..                   | ..       | N.                     | Clear                |
| 30    | 29.581     | 72.0         | 73.9    | 58.4      | ..                   | ..       | W.                     | \ very few in zenith |
| Mean. | 29.489     | 76.5         | 77.5    | 62.5      | ..                   | ..       | ..                     | .....                |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.455     | 93.8         | 93.8    | 69.5      | 92.9                 | 72.2     | 82.55 | ∩ scattered        | ..                           | N.W.                   |
| 2     | 29.411     | 86.0         | 86.9    | 69.5      | 87.6                 | 68.7     | 77.7  | Clear              | ..                           | N.W.                   |
| 3     | 29.425     | 88.0         | 88.6    | 67.7      | 89.0                 | 71.0     | 75.0  | Ditto              | ..                           | W.                     |
| 4     | 29.405     | 89.6         | 89.5    | 81.0      | 88.6                 | 70.2     | 79.4  | Ditto              | ..                           | N.W.                   |
| 5     | 29.395     | 89.2         | 89.4    | 66.3      | 88.4                 | 68.3     | 78.35 | Ditto              | ..                           | N.W.                   |
| 6     | 29.421     | 89.2         | 89.6    | 68.5      | 88.5                 | 69.0     | 78.75 | Ditto              | ..                           | N.W.                   |
| 7     | 29.393     | 90.1         | 89.9    | 69.0      | 88.9                 | 63.3     | 76.1  | Ditto              | ..                           | N.W.                   |
| 8     | 29.369     | 88.9         | 89.2    | 67.4      | 88.4                 | 71.0     | 79.7  | Ditto              | ..                           | N.W.                   |
| 9     | 29.403     | 86.8         | 86.5    | 65.0      | 85.5                 | 67.2     | 76.35 | Ditto              | ..                           | N.W.                   |
| 10    | 29.445     | 88.0         | 88.3    | 65.0      | 87.3                 | 64.      | 75.65 | Ditto              | ..                           | N.W.                   |
| 11    | 29.443     | 86.0         | 86.4    | 65.0      | 85.4                 | 63.0     | 74.2  | Ditto              | ..                           | W.                     |
| 12    | 29.309     | 85.0         | 85.6    | 70.2      | 85.5                 | 65.8     | 75.65 | Ditto              | ..                           | S. E.                  |
| 13    | 39.351     | 84.0         | 85.0    | 67.5      | 85.0                 | 63.0     | 74.0  | Ditto              | ..                           | S. E.                  |
| 14    | 29.385     | 83.5         | 84.9    | 67.3      | 84.0                 | 61.8     | 72.9  | Ditto.             | ..                           | E.                     |
| 15    | 29.439     | 83.8         | 83.8    | 69.0      | 83.0                 | 62.0     | 72.5  | ∩ scattered        | ..                           | E.                     |
| 16    | 29.393     | 79.9         | 80.5    | 66.0      | 78.6                 | 62.0     | 70.8  | Clear              | ..                           | N.W.                   |
| 17    | 29.459     | 77.7         | 77.0    | 62.0      | 76.5                 | 58.0     | 66.75 | Ditto              | ..                           | W.                     |
| 18    | 29.493     | 77.9         | 77.8    | 60.5      | 77.0                 | 55.9     | 66.45 | Ditto              | ..                           | W.                     |
| 19    | 29.481     | 77.5         | 78.0    | 59.6      | 77.0                 | 54.0     | 65.5  | Ditto              | ..                           | N.W.                   |
| 20    | 29.503     | 78.5         | 79.0    | 58.0      | 78.2                 | 54.0     | 66.1  | Ditto              | ..                           | N.W.                   |
| 21    | 29.489     | 80.0         | 79.0    | 60.9      | 78.8                 | 53.0     | 65.9  | ∩ scattered        | ..                           | W.                     |
| 22    | 29.513     | 78.2         | 80.0    | 60.9      | 79.0                 | 56.0     | 67.5  | Clear              | ..                           | W.                     |
| 23    | 29.497     | 77.8         | 77.3    | 61.5      | 77.5                 | 58.      | 67.75 | ∩ all over         | ..                           | N.W.                   |
| 24    | 29.475     | 77.9         | 78.2    | 63.0      | 78.0                 | 58.0     | 68.0  | Clear              | ..                           | N.W.                   |
| 25    | 29.485     | 79.5         | 79.8    | 61.0      | 78.6                 | 57.2     | 67.9  | Ditto              | ..                           | N.W.                   |
| 26    | 29.445     | 81.6         | 81.0    | 62.4      | 80.0                 | 56.      | 68.0  | Ditto              | ..                           | N.W.                   |
| 27    | 29.333     | 78.0         | 79.2    | 65.0      | 79.8                 | 58.0     | 68.9  | Ditto              | ..                           | N.W.                   |
| 28    | 29.425     | 78.6         | 78.2    | 62.9      | 80.0                 | 58.0     | 69.0  | ∩ scattered        | ..                           | S.                     |
| 29    | 29.471     | 79.8         | 79.5    | 60.9      | 78.0                 | 58.5     | 68.25 | Clear              | ..                           | N.                     |
| 30    | 29.541     | 78.0         | 77.25   | 59.0      | 76.3                 | 56.5     | 66.4  | ∩ scattered        | ..                           | N.W.                   |
| Mn.   | 29.435     | 83.1         | 83.4    | 65.05     | 82.7                 | 61.72    | 72.1  | ....               | ..                           | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.571     | 66.0         | 67.4    | 56.5      | ..                   | ..       | W.                     | ✓ scattered        |
| 2     | 29.575     | 69.0         | 70.5    | 57.0      | ..                   | ..       | S.                     | Clear              |
| 3     | 29.655     | 67.0         | 68.6    | 56.4      | ..                   | ..       | S. E.                  | Ditto              |
| 4     | 29.605     | 68.0         | 69.0    | 56.8      | ..                   | ..       | E.                     | Ditto              |
| 5     | 29.575     | 69.5         | 70.0    | 57.2      | ..                   | ..       | N. W.                  | Ditto              |
| 6     | 29.591     | 65.5         | 67.0    | 57.3      | ..                   | ..       | N. W.                  | Ditto              |
| 7     | 29.569     | 63.5         | 64.6    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| 8     | 29.587     | 62.0         | 63.3    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| 9     | 29.543     | 63.0         | 64.2    | 53.0      | ..                   | ..       | N. W.                  | Ditto              |
| 10    | 29.599     | 63.0         | 65.0    | 54.9      | ..                   | ..       | N. W.                  | Ditto              |
| 11    | 29.673     | 63.0         | 64.6    | 55.0      | ..                   | ..       | N.                     | Ditto              |
| 12    | 29.627     | 62.8         | 64.0    | 54.5      | ..                   | ..       | N. W.                  | Ditto              |
| 13    | 29.669     | 63.0         | 65.0    | 55.2      | ..                   | ..       | N.                     | Ditto              |
| 14    | 29.589     | 64.5         | 66.0    | 57.0      | ..                   | ..       | W.                     | Ditto              |
| 15    | 29.625     | 66.6         | 68.6    | 56.8      | ..                   | ..       | W.                     | Ditto              |
| 16    | 29.623     | 65.2         | 67.5    | 58.2      | ..                   | ..       | W.                     | Ditto              |
| 17    | 29.675     | 65.0         | 66.4    | 56.8      | ..                   | ..       | N. E.                  | ✓ scattered        |
| 18    | 29.655     | 63.8         | 65.0    | 54.2      | ..                   | ..       | N.                     | Clear              |
| 19    | 29.615     | 64.0         | 66.0    | 52.0      | ..                   | ..       | W.                     | Ditto              |
| 20    | 29.665     | 64.5         | 65.6    | 52.0      | ..                   | ..       | N.                     | Ditto              |
| 21    | 29.605     | 64.5         | 65.5    | 51.9      | ..                   | ..       | W.                     | Ditto              |
| 22    | 29.655     | 61.7         | 63.0    | 53.3      | ..                   | ..       | W.                     | Few ✓ to N. and W. |
| 23    | 29.699     | 61.2         | 62.9    | 53.5      | ..                   | ..       | N. W.                  | ✓ Scattered        |
| 24    | 29.669     | 61.0         | 63.0    | 52.3      | ..                   | ..       | N.                     | Clear              |
| 25    | 29.649     | 62.5         | 64.0    | 53.0      | ..                   | ..       | N.                     | ✓ all over         |
| 26    | 29.651     | 65.0         | 66.0    | 53.6      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 27    | 29.655     | 63.6         | 65.3    | 52.0      | ..                   | ..       | N. W.                  | Clear              |
| 28    | 29.741     | 62.1         | 63.9    | 52.0      | ..                   | ..       | W.                     | Ditto              |
| 29    | 29.681     | 62.5         | 63.9    | 52.0      | ..                   | ..       | W.                     | Ditto              |
| 30    | 29.641     | 61.5         | 63.2    | 50.6      | ..                   | ..       | N. W.                  | Ditto              |
| 31    | 29.643     | 58.0         | 61.2    | 49.4      | ..                   | ..       | N. W.                  | Ditto              |
| Mean. | 29.631     | 64.0         | 65.5    | 54.1      | ..                   | ..       | ..                     | ..                 |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Mercury.     | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.551     | 68.9         | 69.4    | 57.5      | ..                   | ..       | W.                     | ↘ to E. and N.     |
| 2     | 29.567     | 71.0         | 72.0    | 57.5      | ..                   | ..       | S.                     | ○ scattered        |
| 3     | 29.603     | 72.0         | 73.0    | 59.0      | ..                   | ..       | S. E.                  | Clear              |
| 4     | 29.573     | 73.0         | 74.2    | 59.5      | ..                   | ..       | E.                     | Ditto              |
| 5     | 29.515     | 73.0         | 73.3    | 58.8      | ..                   | ..       | N. W.                  | Ditto              |
| 6     | 29.569     | 69.7         | 70.3    | 57.3      | ..                   | ..       | N. W.                  | Ditto              |
| 7     | 29.531     | 68.0         | 69.0    | 56.0      | ..                   | ..       | N. W.                  | Ditto              |
| 8     | 29.551     | 66.8         | 67.2    | 53.0      | ..                   | ..       | N. W.                  | Ditto              |
| 9     | 29.521     | 68.5         | 70.4    | 55.5      | ..                   | ..       | N. W.                  | Ditto              |
| 10    | 29.559     | 69.2         | 71.5    | 56.0      | ..                   | ..       | N. W.                  | Ditto              |
| 11    | 29.633     | 68.0         | 69.5    | 57.0      | ..                   | ..       | N.                     | Ditto              |
| 12    | 29.593     | 66.9         | 66.9    | 55.0      | ..                   | ..       | N. W.                  | Ditto              |
| 13    | 29.625     | 67.0         | 65.6    | 56.6      | ..                   | ..       | N.                     | Ditto              |
| 14    | 29.411     | 66.0         | 66.2    | 55.0      | ..                   | ..       | W.                     | Ditto              |
| 15    | 29.601     | 70.0         | 72.0    | 58.0      | ..                   | ..       | W.                     | Ditto              |
| 16    | 29.593     | 70.0         | 71.0    | 60.0      | ..                   | ..       | W.                     | Ditto              |
| 17    | 29.605     | 70.0         | 71.5    | 59.0      | ..                   | ..       | N.                     | ↘ scattered        |
| 18    | 29.625     | 70.5         | 71.9    | 56.5      | ..                   | ..       | N.                     | Clear              |
| 19    | 29.593     | 66.0         | 67.0    | 53.0      | ..                   | ..       | W.                     | ↘ to W.            |
| 20    | 29.625     | 66.5         | 68.0    | 53.4      | ..                   | ..       | N.                     | Clear              |
| 21    | 29.591     | 67.0         | 66.0    | 54.0      | ..                   | ..       | W.                     | Ditto              |
| 22    | 29.627     | 64.2         | 65.9    | 55.0      | ..                   | ..       | W.                     | Few ○ to N. and W. |
| 23    | 29.645     | 65.0         | 65.9    | 55.0      | ..                   | ..       | N. W.                  | ↘ scattered        |
| 24    | 29.593     | 65.5         | 66.6    | 55.6      | ..                   | ..       | N.                     | Clear              |
| 25    | 29.605     | 64.0         | 66.0    | 56.0      | ..                   | ..       | N.                     | ○ all over         |
| 26    | 29.631     | 68.0         | 69.5    | 55.3      | ..                   | ..       | N. W.                  | ↘ scattered        |
| 27    | 29.613     | 65.7         | 68.0    | 53.8      | ..                   | ..       | N. W.                  | Clear              |
| 28    | 29.717     | 67.0         | 69.0    | 53.5      | ..                   | ..       | W.                     | Ditto              |
| 29    | 29.633     | 68.0         | 70.2    | 53.0      | ..                   | ..       | W.                     | Ditto              |
| 30    | 29.609     | 66.5         | 68.4    | 51.4      | ..                   | ..       | N. W.                  | Ditto              |
| 31    | 29.605     | 65.8         | 67.5    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| Mean. | 29.591     | 68.0         | 69.1    | 55.7      | ..                   | ..       | ..                     | ..                 |



*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.   | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|----------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                      |                              |                        |
| 1     | 29.507     | 74.5         | 74.5    | 59.2      | 55.5                 | 55.5     | 64.5  | W to E. and N.       | ..                           | W.                     |
| 2     | 29.507     | 75.5         | 74.5    | 59.8      | 74.0                 | 55.7     | 64.85 | scattered            | ..                           | S. E.                  |
| 3     | 29.569     | 76.2         | 75.0    | 61.6      | 75.2                 | 57.0     | 66.1  | Clear                | ..                           | S. E.                  |
| 4     | 29.505     | 76.5         | 75.6    | 60.2      | 76.0                 | 55.5     | 65.75 | Ditto                | ..                           | E.                     |
| 5     | 29.483     | 77.7         | 76.6    | 60.0      | 75.5                 | 54.8     | 65.15 | Ditto                | ..                           | N.W.                   |
| 6     | 29.505     | 75.5         | 73.7    | 56.4      | 73.5                 | 56.0     | 64.75 | scattered towards W. | ..                           | N.W.                   |
| 7     | 29.477     | 73.8         | 72.5    | 56.0      | 71.5                 | 48.5     | 60.0  | Clear                | ..                           | N.W.                   |
| 8     | 29.499     | 70.0         | 69.5    | 54.3      | 71.0                 | 48.3     | 59.65 | Ditto                | ..                           | N.W.                   |
| 9     | 29.473     | 70.6         | 71.2    | 56.9      | 71.0                 | 48.9     | 59.95 | Ditto                | ..                           | N.W.                   |
| 10    | 29.493     | 71.2         | 72.0    | 57.6      | 72.0                 | 54.5     | 63.25 | Ditto                | ..                           | N.W.                   |
| 11    | 29.563     | 78.0         | 76.0    | 60.5      | 76.5                 | 56.0     | 66.25 | Ditto                | ..                           | N.W.                   |
| 12    | 29.505     | 75.8         | 75.0    | 56.0      | 75.0                 | 56.0     | 65.50 | Ditto                | ..                           | W.                     |
| 13    | 29.549     | 76.8         | 76.0    | 58.0      | 77.0                 | 56.0     | 65.5  | Ditto [W.            | ..                           | N.                     |
| 14    | 29.497     | 76.6         | 74.0    | 60.0      | 73.0                 | 55.0     | 64.0  | W a few to           | ..                           | W.                     |
| 15    | 29.535     | 77.7         | 74.5    | 61.6      | 74.5                 | 55.0     | 64.75 | Clear                | ..                           | W.                     |
| 16    | 29.529     | 78.9         | 76.9    | 61.0      | 76.0                 | 54.5     | 65.25 | Ditto                | ..                           | W.                     |
| 17    | 29.567     | 75.5         | 72.9    | 60.3      | 72.5                 | 57.0     | 64.75 | Ditto                | ..                           | N. E.                  |
| 18    | 29.512     | 77.2         | 75.4    | 58.9      | 74.0                 | 56.0     | 65.0  | Ditto                | ..                           | N.                     |
| 19    | 29.541     | 75.6         | 73.0    | 57.7      | 73.1                 | 50.8     | 61.95 | W to W.              | ..                           | W.                     |
| 20    | 29.533     | 76.0         | 73.9    | 55.0      | 74.0                 | 50.0     | 62.0  | Clear                | ..                           | N.W.                   |
| 21    | 29.539     | 76.0         | 74.0    | 57.0      | 73.0                 | 52.0     | 62.5  | Ditto                | ..                           | W.                     |
| 22    | 29.593     | 76.0         | 73.6    | 58.0      | 73.0                 | 49.0     | 61.0  | Ditto                | ..                           | W.                     |
| 23    | 29.619     | 75.0         | 72.9    | 57.3      | 71.8                 | 51.0     | 61.4  | W scattered          | ..                           | N.W.                   |
| 24    | 29.563     | 76.5         | 74.9    | 60.0      | 73.8                 | 50.0     | 61.9  | Clear                | ..                           | N.                     |
| 25    | 29.569     | 75.0         | 74.0    | 58.0      | 73.0                 | 50.5     | 61.75 | all over             | ..                           | N.                     |
| 26    | 29.605     | 74.5         | 73.8    | 57.2      | 72.8                 | 50.0     | 61.4  | scattered            | ..                           | N.W.                   |
| 27    | 29.571     | 70.7         | 70.0    | 53.0      | 70.0                 | 52.0     | 61.0  | Clear                | ..                           | N.W.                   |
| 28    | 29.701     | 76.0         | 73.4    | 57.3      | 73.0                 | 52.0     | 62.5  | Ditto                | ..                           | N.                     |
| 29    | 29.601     | 76.0         | 74.0    | 56.0      | 74.2                 | 51.0     | 62.6  | Ditto                | ..                           | W.                     |
| 30    | 29.589     | 75.0         | 73.1    | 55.3      | 72.2                 | 49.0     | 60.6  | Ditto                | ..                           | N.W.                   |
| 31    | 29.587     | 75.0         | 73.0    | 55.0      | 73.0                 | 47.5     | 60.25 | Ditto                | ..                           | N.W.                   |
| Mn.   | 29.545     | 75.3         | 73.9    | 57.6      | 73.2                 | 52.7     | 63.1  | ..                   | ..                           | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of January, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.589     | 59.8         | 61.8    | 50.0      | ..                   | ..       | N. W.                  | Clear              |
| 2     | 29.575     | 60.8         | 62.5    | 51.4      | ..                   | ..       | N. W.                  | Ditto              |
| 3     | 29.583     | 61.7         | 63.0    | 53.0      | ..                   | ..       | E.                     | ✓ scattered        |
| 4     | 29.605     | 59.5         | 61.3    | 51.3      | ..                   | ..       | W.                     | Clear              |
| 5     | 29.663     | 58.5         | 60.0    | 51.0      | ..                   | ..       | W.                     | Ditto              |
| 6     | 29.685     | 61.0         | 62.9    | 53.7      | ..                   | ..       | S. E.                  | ✓ scattered        |
| 7     | 29.669     | 62.0         | 64.2    | 56.0      | ..                   | ..       | W.                     | Clear              |
| 8     | 29.649     | 62.3         | 64.5    | 56.0      | ..                   | ..       | W.                     | Ditto              |
| 9     | 29.643     | 60.5         | 61.8    | 49.0      | ..                   | ..       | N. W.                  | Ditto              |
| 10    | 29.715     | 66.5         | 67.5    | 54.0      | ..                   | ..       | N. W.                  | Ditto              |
| 11    | 29.693     | 60.8         | 61.6    | 52.0      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 12    | 29.629     | 65.0         | 66.5    | 54.0      | ..                   | ..       | N. W.                  | Ditto              |
| 13    | 29.671     | 61.5         | 63.0    | 52.9      | ..                   | ..       | N.                     | Clear              |
| 14    | 29.651     | 61.7         | 62.5    | 52.8      | ..                   | ..       | W.                     | ~ a few scattered  |
| 15    | 29.637     | 61.0         | 62.0    | 52.0      | ..                   | ..       | N. W.                  | Clear              |
| 16    | 29.691     | 59.9         | 61.9    | 52.0      | ..                   | ..       | N.                     | Ditto              |
| 17    | 29.611     | 60.5         | 62.6    | 49.2      | ..                   | ..       | N. W.                  | Ditto              |
| 18    | 29.625     | 59.0         | 60.5    | 48.9      | ..                   | ..       | N. W.                  | Ditto              |
| 19    | 29.585     | 60.7         | 62.0    | 49.2      | ..                   | ..       | N. W.                  | Ditto              |
| 20    | 29.577     | 61.5         | 64.1    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| 21    | 29.605     | 63.0         | 65.5    | 52.4      | ..                   | ..       | W.                     | Ditto              |
| 22    | 29.651     | 63.5         | 65.0    | 52.7      | ..                   | ..       | W.                     | Ditto              |
| 23    | 29.637     | 63.0         | 66.0    | 54.0      | ..                   | ..       | W.                     | Ditto              |
| 24    | 29.609     | 62.0         | 63.4    | 53.0      | ..                   | ..       | W.                     | ✓ a few scattered  |
| 25    | 29.605     | 63.0         | 64.5    | 54.0      | ..                   | ..       | N. W.                  | Clear              |
| 26    | 29.591     | 66.5         | 70.2    | 59.9      | ..                   | ..       | E.                     | Ditto              |
| 27    | 29.611     | 71.6         | 72.4    | 60.6      | ..                   | ..       | E.                     | Ditto              |
| 28    | 29.539     | 71.9         | 73.6    | 61.5      | ..                   | ..       | S. E.                  | ✓ scattered        |
| 29    | 29.569     | 71.6         | 73.0    | 61.6      | ..                   | ..       | E.                     | ✓ a few scattered  |
| 30    | 29.473     | 69.9         | 69.0    | 65.0      | ..                   | ..       | N. W.                  | ✓ all over         |
| 31    | 29.567     | 59.5         | 59.0    | 53.0      | ..                   | ..       | N. W.                  | Ditto              |
| Mean. | 29.619     | 63.9         | 64.4    | 53.5      | ..                   | ..       | ..                     | ..                 |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of January, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.         |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                            |
| 1     | 29.553     | 64.8         | 67.0    | 50.9      | ..                   | ..       | N. W.                  | Clear                      |
| 2     | 29.519     | 65.9         | 66.9    | 52.5      | ..                   | ..       | W.                     | Ditto                      |
| 3     | 29.533     | 65.8         | 67.0    | 54.5      | ..                   | ..       | S. E.                  | Ditto                      |
| 4     | 29.565     | 63.8         | 64.1    | 52.0      | ..                   | ..       | W.                     | Ditto                      |
| 5     | 29.571     | 63.0         | 64.5    | 53.0      | ..                   | ..       | W.                     | Ditto                      |
| 6     | 29.645     | 65.0         | 66.8    | 55.3      | ..                   | ..       | S. E.                  | ~ scattered                |
| 7     | 29.631     | 66.2         | 67.4    | 56.5      | ..                   | ..       | W.                     | Clear                      |
| 8     | 29.605     | 66.8         | 67.5    | 56.5      | ..                   | ..       | W.                     | Ditto                      |
| 9     | 29.605     | 66.9         | 67.2    | 52.0      | ..                   | ..       | N. W.                  | Ditto                      |
| 10    | 29.685     | 71.5         | 72.7    | 54.5      | ..                   | ..       | N. W.                  | Ditto                      |
| 11    | 29.655     | 66.0         | 66.9    | 53.0      | ..                   | ..       | N. W.                  | ~ scattered                |
| 12    | 29.613     | 65.9         | 66.2    | 54.8      | ..                   | ..       | N. W.                  | Ditto                      |
| 13    | 29.655     | 69.2         | 69.4    | 54.6      | ..                   | ..       | N.                     | ~ ditto                    |
| 14    | 29.605     | 65.0         | 66.2    | 54.6      | ..                   | ..       | W.                     | Clear                      |
| 15    | 29.591     | 66.0         | 67.2    | 55.0      | ..                   | ..       | N. W.                  | Ditto                      |
| 16    | 29.655     | 66.5         | 68.4    | 52.2      | ..                   | ..       | N.                     | Ditto                      |
| 17    | 29.571     | 56.5         | 67.2    | 51.2      | ..                   | ..       | N. W.                  | Ditto                      |
| 18    | 29.550     | 65.0         | 66.2    | 50.7      | ..                   | ..       | N. W.                  | Ditto                      |
| 19    | 29.545     | 67.0         | 68.1    | 52.2      | ..                   | ..       | N. W.                  | Ditto                      |
| 20    | 29.535     | 68.0         | 71.0    | 54.0      | ..                   | ..       | W.                     | Ditto                      |
| 21    | 29.545     | 66.0         | 67.4    | 53.5      | ..                   | ..       | W.                     | Ditto                      |
| 22    | 29.567     | 65.9         | 67.0    | 53.2      | ..                   | ..       | W.                     | Ditto                      |
| 23    | 29.607     | 69.5         | 70.8    | 54.5      | ..                   | ..       | W.                     | Ditto                      |
| 24    | 29.594     | 63.6         | 64.5    | 54.0      | ..                   | ..       | N. W.                  | ~ a few scattered          |
| 25    | 29.559     | 71.5         | 73.3    | 59.8      | ..                   | ..       | W.                     | Clear                      |
| 26    | 29.555     | 72.3         | 73.8    | 60.3      | ..                   | ..       | E.                     | Ditto                      |
| 27    | 29.547     | 79.0         | 80.0    | 63.3      | ..                   | ..       | E.                     | Ditto                      |
| 28    | 29.491     | 76.4         | 79.9    | 63.2      | ..                   | ..       | S. E.                  | Ditto                      |
| 29    | 29.493     | 76.2         | 79.6    | 63.5      | ..                   | ..       | E.                     | ~ to E. W. and S.          |
| 30    | 29.435     | 72.0         | 72.0    | 61.5      | ..                   | ..       | N. W.                  | ~ all over                 |
| 31    | 29.521     | 63.6         | 63.3    | 57.2      | ..                   | ..       | N. W.                  | ~ to E. and S. in horizon. |
| Mean. | 29.574     | 67.8         | 69.0    | 55.3      | ..                   | ..       | ..                     | ..                         |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Jan. 1853.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.      | 3 Ft. 2 In. from the ground. | Rain Gauges. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|-------------------------|------------------------------|--------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                         |                              |              |
| 1     | 29.493     | 74.6         | 74.0    | 53.0      | 74.0                 | 47.0     | 60.5  | Clear                   | ..                           | N. W.        |
| 2     | 29.523     | 71.5         | 69.0    | 55.0      | 70.0                 | 47.0     | 51.1  | ✓ scattered             | ..                           | W.           |
| 3     | 29.509     | 71.3         | 69.0    | 54.7      | 69.0                 | 51.5     | 60.25 | Clear                   | ..                           | S.           |
| 4     | 29.559     | 71.5         | 70.0    | 55.9      | 69.5                 | 46.8     | 58.65 | Ditto                   | ..                           | W.           |
| 5     | 29.547     | 70.0         | 69.0    | 56.0      | 69.0                 | 49.5     | 59.25 | Ditto                   | ..                           | W.           |
| 6     | 29.609     | 71.0         | 68.6    | 57.0      | 69.0                 | 51.5     | 60.25 | ✓ to E.                 | ..                           | S. E.        |
| 7     | 29.493     | 76.6         | 74.0    | 57.7      | 72.0                 | 53.8     | 62.9  | Clear                   | ..                           | W.           |
| 8     | 29.561     | 75.2         | 74.0    | 56.0      | 73.2                 | 51.2     | 62.2  | Ditto                   | ..                           | W.           |
| 9     | 29.577     | 75.6         | 74.9    | 56.5      | 74.0                 | 49.5     | 61.75 | Ditto                   | ..                           | N. W.        |
| 10    | 29.625     | 77.0         | 75.6    | 58.5      | 75.0                 | 49.0     | 62.0  | Ditto                   | ..                           | W.           |
| 11    | 29.591     | 75.0         | 74.0    | 56.0      | 74.0                 | 51.0     | 62.5  | ✓ scattered             | ..                           | N. W.        |
| 12    | 29.587     | 70.5         | 69.6    | 50.0      | 72.0                 | 50.8     | 61.4  | ✓ all over              | ..                           | N. W.        |
| 13    | 29.591     | 72.5         | 71.5    | 57.7      | 71.0                 | 53.0     | 62.0  | ✓ a few in horizon      | ..                           | N.           |
| 14    | 29.597     | 73.0         | 72.0    | 57.9      | 71.6                 | 51.0     | 61.3  | Clear                   | ..                           | W.           |
| 15    | 29.525     | 73.0         | 72.0    | 56.0      | 72.2                 | 50.0     | 61.1  | Ditto                   | ..                           | W.           |
| 16    | 29.615     | 73.0         | 72.0    | 54.5      | 71.6                 | 49.5     | 60.55 | Ditto                   | ..                           | N.           |
| 17    | 29.537     | 72.0         | 72.0    | 53.5      | 71.0                 | 49.9     | 60.45 | Ditto                   | ..                           | N. W.        |
| 18    | 29.541     | 71.0         | 71.0    | 52.9      | 70.0                 | 50.0     | 60.0  | Ditto                   | ..                           | N. W.        |
| 19    | 29.489     | 74.0         | 73.5    | 55.2      | 72.8                 | 49.0     | 60.9  | Ditto                   | ..                           | N. W.        |
| 20    | 29.505     | 74.0         | 72.9    | 52.9      | 73.9                 | 51.0     | 62.45 | Ditto                   | ..                           | W.           |
| 21    | 29.515     | 74.2         | 73.5    | 54.0      | 74.0                 | 51.0     | 62.5  | Ditto                   | ..                           | W.           |
| 22    | 29.493     | 73.8         | 73.0    | 53.6      | 74.3                 | 51.2     | 62.75 | Ditto                   | ..                           | W.           |
| 23    | 29.571     | 75.0         | 76.2    | 57.0      | 76.0                 | 51.0     | 63.5  | Ditto                   | ..                           | W.           |
| 24    | 29.547     | 67.0         | 69.5    | 57.5      | 70.0                 | 54.0     | 62.0  | ✓ scattered             | ..                           | W.           |
| 25    | 29.499     | 75.5         | 76.7    | 59.7      | 75.8                 | 56.0     | 65.9  | Clear                   | ..                           | W.           |
| 26    | 29.507     | 79.9         | 79.8    | 64.0      | 80.0                 | 52.0     | 66.0  | Ditto                   | ..                           | E.           |
| 27    | 29.509     | 82.0         | 82.4    | 65.0      | 81.5                 | 61.0     | 71.25 | Ditto                   | ..                           | N. E.        |
|       |            |              |         |           | 83.2                 | 60.5     | 71.85 | ✓ in hor. to S. E. & W. | ..                           | S. E.        |
| 28    | 29.413     | 83.6         | 83.2    | 65.5      |                      |          |       | ✓ scattered             | ..                           | E.           |
| 29    | 29.421     | 83.5         | 83.0    | 65.7      | 83.0                 | 64.0     | 73.5  | ✓ all over              | ..                           | N. W.        |
| 30    | 29.389     | 75.6         | 74.8    | 62.7      | 74.6                 | 63.6     | 69.1  | ✓ to E. and S. in hor.  | 0.5                          | N. W.        |
| 31    | 29.509     | 69.5         | 66.9    | 55.8      | 66.5                 | 58.2     | 62.35 |                         |                              |              |
| Mn.   | 29.531     | 74.3         | 73.5    | 57.0      | 73.3                 | 52.4     | 62.8  | ..                      | 0.5                          | ..           |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of February, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.561     | 57.7         | 57.9    | 46.0      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 2     | 29.479     | 54.9         | 55.3    | 45.4      | ..                   | ..       | N. W.                  | Clear                |
| 3     | 29.521     | 57.5         | 58.5    | 47.4      | ..                   | ..       | W.                     | Ditto                |
| 4     | 29.525     | 59.7         | 61.0    | 50.5      | ..                   | ..       | S. E.                  | ✓ all over           |
| 5     | 29.569     | 59.8         | 60.2    | 50.5      | ..                   | ..       | E.                     | ✓ scattered          |
| 6     | 29.565     | 58.9         | 59.5    | 50.0      | ..                   | ..       | W.                     | Clear                |
| 7     | 29.633     | 57.3         | 59.0    | 49.5      | ..                   | ..       | W.                     | Ditto                |
| 8     | 29.621     | 64.0         | 66.0    | 62.0      | ..                   | ..       | ..                     | ✓ scattered          |
| 9     | 29.491     | 65.0         | 67.3    | 53.4      | ..                   | ..       | N. W.                  | Clear                |
| 10    | 29.355     | 69.0         | 69.3    | 58.5      | ..                   | ..       | E.                     | Hazy                 |
| 11    | 29.495     | 62.7         | 64.5    | 55.5      | ..                   | ..       | E.                     | Clear                |
| 12    | 29.483     | 63.5         | 64.2    | 54.6      | ..                   | ..       | E.                     | ✓ scattered          |
| 13    | 29.475     | 65.0         | 67.0    | 54.3      | ..                   | ..       | E.                     | ✓ all over           |
| 14    | 29.415     | 62.5         | 63.0    | 57.4      | ..                   | ..       | S. E.                  | Clear                |
| 15    | 29.571     | 65.0         | 66.0    | 59.0      | ..                   | ..       | E.                     | ✓ very few scattered |
| 16    | 29.599     | 67.7         | 69.0    | 58.5      | ..                   | ..       | S. E.                  | ✓ scattered          |
| 17    | 29.663     | 67.7         | 69.3    | 57.7      | ..                   | ..       | E.                     | Clear                |
| 18    | 29.765     | 65.0         | 66.0    | 61.6      | ..                   | ..       | E.                     | ✓ to E. and N.       |
| 19    | 29.661     | 65.6         | 65.9    | 61.0      | ..                   | ..       | W.                     | Clear                |
| 20    | 29.639     | 65.5         | 65.5    | 62.0      | ..                   | ..       | N. W.                  | ✓ scattered all over |
| 21    | 29.647     | 67.8         | 68.5    | 58.2      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 22    | 29.605     | 64.6         | 65.2    | 58.0      | ..                   | ..       | E.                     | ✓ a few scattered    |
| 23    | 29.591     | 65.3         | 66.2    | 62.2      | ..                   | ..       | E.                     | ✓ all over           |
| 24    | 29.627     | 67.8         | 68.0    | 62.0      | ..                   | ..       | E.                     | Hazy to E.           |
| 25    | 29.547     | 70.0         | 70.4    | 62.5      | ..                   | ..       | N.                     | ✓ scattered          |
| 26    | 29.507     | 68.0         | 68.5    | 60.0      | ..                   | ..       | E.                     | ✓ scattered          |
| 27    | 29.467     | 68.5         | 69.0    | 58.2      | ..                   | ..       | N. W.                  | Clear                |
| 28    | 29.433     | 71.5         | 72.5    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| Mean. | 2.9554     | 64.2         | 65.1    | 56.2      | ..                   | ..       | ..                     | ..                   |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Feb. 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                       |
| 1     | 29.531     | 62.0         | 62.2    | 48.4      | ..                   | ..       | N. W.                  | ∩ scattered           |
| 2     | 29.439     | 60.0         | 60.7    | 49.5      | ..                   | ..       | N. W.                  | Clear                 |
| 3     | 29.483     | 61.9         | 62.4    | 50.6      | ..                   | ..       | W.                     | Ditto                 |
| 4     | 29.497     | 62.8         | 64.0    | 51.7      | ..                   | ..       | S. E.                  | ∩ all over            |
| 5     | 29.523     | 64.0         | 64.6    | 51.0      | ..                   | ..       | E.                     | ∩ scattered           |
| 6     | 29.505     | 63.9         | 63.9    | 49.2      | ..                   | ..       | W.                     | Ditto                 |
| 7     | 29.599     | 64.0         | 66.3    | 50.8      | ..                   | ..       | W.                     | Clear                 |
| 8     | 29.577     | 68.0         | 69.0    | 51.5      | ..                   | ..       | ..                     | Ditto                 |
| 9     | 29.431     | 69.0         | 70.8    | 53.9      | ..                   | ..       | S. W.                  | Ditto                 |
| 10    | 29.339     | 70.9         | 70.7    | 60.5      | ..                   | ..       | W.                     | Ditto                 |
| 11    | 29.431     | 64.0         | 64.0    | 57.0      | ..                   | ..       | E                      | Ditto                 |
| 12    | 29.445     | 68.0         | 69.4    | 56.0      | ..                   | ..       | E.                     | ∩ scattered           |
| 13    | 29.435     | 69.8         | 71.0    | 56.2      | ..                   | ..       | N. W.                  | ∩ all over            |
| 14    | 29.401     | 64.8         | 65.5    | 58.8      | ..                   | ..       | S. E.                  | Clear                 |
| 15    | 29.539     | 67.6         | 68.4    | 58.4      | ..                   | ..       | E.                     | ∩ very few scattered  |
| 16    | 29.561     | 69.0         | 70.8    | 59.5      | ..                   | ..       | S. E.                  | ∩ scattered           |
| 17    | 29.645     | 72.5         | 73.8    | 60.5      | ..                   | ..       | S.S.E.                 | ∩ ditto               |
| 18    | 29.725     | 70.0         | 70.3    | 62.1      | ..                   | ..       | N. W.                  | Clear                 |
| 19    | 29.627     | 70.8         | 71.0    | 61.9      | ..                   | ..       | W.                     | Ditto                 |
| 20    | 29.601     | 68.0         | 68.3    | 63.2      | ..                   | ..       | N. W.                  | ∩ scattered all over  |
| 21    | 29.605     | 70.6         | 71.4    | 59.1      | ..                   | ..       | N. W.                  | ∩ scattered           |
| 22    | 29.575     | 69.5         | 70.3    | 60.5      | ..                   | ..       | E.                     | ∩ all over            |
| 23    | 29.567     | 68.5         | 68.7    | 63.4      | ..                   | ..       | E.                     | ∩ scattered           |
| 24    | 29.587     | 71.5         | 72.3    | 63.4      | ..                   | ..       | W.                     | ∩ scattered           |
| 25    | 29.455     | 73.0         | 73.5    | 64.0      | ..                   | ..       | N. E.                  | ∩ ditto               |
| 26    | 29.493     | 69.9         | 70.2    | 61.2      | ..                   | ..       | N. E.                  | ∩ ditto               |
| 27    | 29.445     | 73.0         | 73.3    | 57.4      | ..                   | ..       | W.                     | ∩ scattered in zenith |
| 28    | 29.411     | 76.5         | 77.5    | 59.5      | ..                   | ..       | N. W.                  | Clear                 |
| Mean. | 29.517     | 68.0         | 68.7    | 57.1      | ..                   | ..       | ..                     | ..                    |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Feb. 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.   | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|----------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                      | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.455     | 67.0         | 66.0    | 50.5      | 66.0                 | 51.0     | 58.5  | ~ scattered          | ..                           | N.W.                   |
| 2     | 29.405     | 64.0         | 64.6    | 49.6      | 64.0                 | 44.5     | 54.25 | Clear                | ..                           | N.W.                   |
| 3     | 29.445     | 68.0         | 68.0    | 51.5      | 67.0                 | 45.0     | 56.0  | Ditto                | ..                           | N.W.                   |
| 4     | 29.429     | 66.0         | 66.5    | 52.5      | 66.0                 | 45.0     | 55.5  | ~ all over           | ..                           | S. E.                  |
| 5     | 29.473     | 67.5         | 67.0    | 53.0      | 67.0                 | 46.0     | 56.5  | ~ scattered          | ..                           | E.                     |
| 6     | 29.465     | 67.9         | 67.6    | 52.0      | 68.2                 | 46.0     | 57.1  | Ditto                | ..                           | W.                     |
| 7     | 29.567     | 69.0         | 68.6    | 54.0      | 68.0                 | 47.5     | 57.75 | Clear                | ..                           | W.                     |
| 8     | 29.505     | 74.0         | 73.0    | 53.6      | 73.6                 | 49.5     | 61.05 | Ditto                | ..                           | W.                     |
| 9     | 29.403     | 76.0         | 75.4    | 57.4      | 75.0                 | 53.0     | 64.0  | ~ all over           | ..                           | S. W.                  |
| 10    | 29.329     | 73.2         | 73.0    | 60.8      | 72.8                 | 53.0     | 62.9  | Clear                | ..                           | W.                     |
| 11    | 29.391     | 71.6         | 71.2    | 59.5      | 71.0                 | 51.0     | 61.0  | Ditto                | ..                           | E.                     |
| 12    | 29.405     | 75.0         | 74.6    | 57.2      | 72.2                 | 51.0     | 61.6  | ~ scattered          | ..                           | E.                     |
| 13    | 29.325     | 67.7         | 67.0    | 55.3      | 69.5                 | 56.0     | 62.75 | Ditto                | ..                           | E.                     |
| 14    | 29.329     | 66.0         | 66.9    | 59.6      | 66.5                 | 51.0     | 58.75 | ~ to N. and W.       | ..                           | S. E.                  |
| 15    | 29.455     | 71.5         | 71.5    | 58.5      | 71.0                 | 52.0     | 61.5  | ~ scattered          | ..                           | S. E.                  |
| 16    | 29.505     | 72.2         | 72.0    | 60.2      | 72.0                 | 56.5     | 64.25 | ~ ditto              | ..                           | S. E.                  |
| 17    | 29.605     | 74.2         | 74.9    | 61.8      | 74.0                 | 60.0     | 67.0  | ~ ditto              | ..                           | S. E.                  |
| 18    | 29.699     | 75.5         | 75.8    | 63.3      | 77.0                 | 64.5     | 70.75 | Clear                | ..                           | N.W.                   |
| 19    | 29.591     | 75.9         | 76.2    | 62.6      | 76.0                 | 62.6     | 69.3  | Ditto                | ..                           | W.                     |
| 20    | 29.539     | 72.6         | 72.6    | 64.6      | 72.6                 | 57.5     | 65.05 | ~ scattered all over | ..                           | N.W.                   |
| 21    | 29.513     | 74.8         | 74.2    | 60.0      | 75.0                 | 57.5     | 66.25 | ~ scattered          | ..                           | S. E.                  |
| 22    | 29.535     | 71.0         | 71.0    | 59.0      | 74.0                 | 62.8     | 68.4  | ~ all over           | ..                           | E.                     |
| 23    | 29.525     | 72.4         | 72.0    | 63.8      | 71.5                 | 60.0     | 65.75 | Ditto                | ..                           | E.                     |
| 24    | 29.521     | 75.6         | 75.4    | 65.1      | 75.0                 | 61.0     | 68.0  | ~ scattered          | ..                           | N.W.                   |
| 25    | 29.405     | 76.7         | 76.7    | 66.5      | 76.5                 | 65.0     | 70.75 | Ditto                | ..                           | N. E.                  |
| 26    | 29.437     | 74.0         | 75.4    | 64.0      | 75.5                 | 62.6     | 69.05 | Ditto                | ..                           | N. E.                  |
| 27    | 29.375     | 79.0         | 78.0    | 61.0      | 78.0                 | 59.0     | 68.5  | Clear                | ..                           | N.W.                   |
| 28    | 29.351     | 82.7         | 83.0    | 63.8      | 82.2                 | 73.0     | 77.6  | Ditto                | ..                           | N.W.                   |
| Mn.   | 29.464     | 72.2         | 72.1    | 58.6      | 72.0                 | 55.1     | 63.5  | ..                   | ..                           | ..                     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|---------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                        | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                           | o    | o     |
| 1     | 29.908                                          | 29.995                                    | 29.819  | 0.176   | 72.2                          | 81.3                                        | 65.5 | 15.8  |
| 2     | .851                                            | .924                                      | .802    | .122    | 70.1                          | 75.0                                        | 66.6 | 8.4   |
| 3     | .912                                            | .985                                      | .841    | .144    | 66.6                          | 73.8                                        | 60.2 | 13.6  |
| 4     | .999                                            | 30.087                                    | .946    | .141    | 63.9                          | 74.0                                        | 55.1 | 18.9  |
| 5     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 6     | .930                                            | .003                                      | .871    | .132    | 71.5                          | 80.2                                        | 66.2 | 14.0  |
| 7     | 30.018                                          | .113                                      | .964    | .149    | 68.1                          | 77.0                                        | 59.0 | 18.0  |
| 8     | .009                                            | .093                                      | .941    | .152    | 66.5                          | 76.8                                        | 57.0 | 19.8  |
| 9     | 29.943                                          | .031                                      | .877    | .154    | 67.4                          | 78.4                                        | 58.3 | 20.1  |
| 10    | .950                                            | .032                                      | .899    | .133    | 68.7                          | 79.9                                        | 59.2 | 20.7  |
| 11    | .943                                            | .031                                      | .883    | .148    | 69.1                          | 77.2                                        | 62.6 | 14.6  |
| 12    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 13    | .935                                            | .033                                      | .873    | .160    | 68.3                          | 71.2                                        | 65.4 | 5.8   |
| 14    | .909                                            | 29.969                                    | .836    | .133    | 64.7                          | 67.4                                        | 63.0 | 4.4   |
| 15    | .960                                            | 30.037                                    | .905    | .132    | 67.1                          | 75.6                                        | 61.6 | 14.0  |
| 16    | 30.078                                          | .165                                      | 30.006  | .159    | 68.3                          | 78.0                                        | 59.4 | 18.6  |
| 17    | .148                                            | .242                                      | .088    | .154    | 69.5                          | 80.7                                        | 60.0 | 20.7  |
| 18    | .121                                            | .208                                      | .046    | .162    | 71.1                          | 82.4                                        | 61.2 | 21.2  |
| 19    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 20    | .056                                            | .138                                      | 29.994  | .144    | 73.2                          | 83.6                                        | 62.8 | 20.8  |
| 21    | .010                                            | .105                                      | .941    | .164    | 73.6                          | 84.9                                        | 62.5 | 22.4  |
| 22    | .019                                            | .120                                      | .962    | .158    | 74.5                          | 85.6                                        | 65.4 | 20.2  |
| 23    | 29.989                                          | .073                                      | .910    | .163    | 76.3                          | 87.8                                        | 66.1 | 21.7  |
| 24    | .958                                            | .032                                      | .871    | .161    | 76.7                          | 85.8                                        | 68.5 | 17.3  |
| 25    | .929                                            | .016                                      | .878    | .138    | 76.9                          | 86.2                                        | 68.6 | 17.6  |
| 26    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 27    | .797                                            | 29.878                                    | .741    | .137    | 73.9                          | 82.7                                        | 67.2 | 15.5  |
| 28    | .808                                            | .882                                      | .761    | .121    | 76.4                          | 86.5                                        | 67.4 | 19.1  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | o                          | o                   | o                   | o                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 68.8                       | 3.5                 | 67.0                | 5.2                       | 0.660                         | 7.24                                          | 1.44                                                          | 0.852                                                     |
| 2     | 67.4                       | 2.7                 | 65.9                | 4.2                       | .637                          | 7.01                                          | 1.03                                                          | .876                                                      |
| 3     | 61.9                       | 4.7                 | 59.3                | 7.4                       | .512                          | 5.67                                          | 1.58                                                          | .795                                                      |
| 4     | 59.3                       | 4.6                 | 56.5                | 7.3                       | .468                          | 5.20                                          | 1.54                                                          | .792                                                      |
| 5     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 6     | 67.4                       | 4.1                 | 65.2                | 6.3                       | .622                          | 6.83                                          | 1.63                                                          | .826                                                      |
| 7     | 62.7                       | 5.4                 | 59.6                | 8.5                       | .521                          | 5.75                                          | 1.91                                                          | .762                                                      |
| 8     | 60.9                       | 5.6                 | 57.6                | 8.9                       | .485                          | 5.37                                          | 1.96                                                          | .753                                                      |
| 9     | 62.6                       | 4.8                 | 59.8                | 7.5                       | .524                          | 5.79                                          | 1.76                                                          | .787                                                      |
| 10    | 65.0                       | 3.7                 | 63.0                | 5.7                       | .582                          | 6.41                                          | 1.47                                                          | .838                                                      |
| 11    | 66.8                       | 2.3                 | 65.6                | 3.6                       | .631                          | 6.95                                          | 0.92                                                          | .891                                                      |
| 12    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 13    | 66.4                       | 1.9                 | 65.3                | 2.9                       | .625                          | 6.90                                          | 0.70                                                          | .909                                                      |
| 14    | 63.6                       | 1.1                 | 62.9                | 1.8                       | .576                          | 6.41                                          | 0.39                                                          | .943                                                      |
| 15    | 65.1                       | 2.0                 | 64.0                | 3.1                       | .599                          | 6.63                                          | 0.76                                                          | .904                                                      |
| 16    | 65.2                       | 3.1                 | 63.5                | 4.8                       | .591                          | 6.52                                          | 1.22                                                          | .861                                                      |
| 17    | 65.6                       | 3.9                 | 63.4                | 6.1                       | .590                          | 6.49                                          | 1.56                                                          | .827                                                      |
| 18    | 66.9                       | 4.2                 | 64.7                | 6.4                       | .615                          | 6.74                                          | 1.72                                                          | .821                                                      |
| 19    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 20    | 68.7                       | 4.5                 | 66.4                | 6.8                       | .649                          | 7.09                                          | 1.90                                                          | .811                                                      |
| 21    | 68.8                       | 4.8                 | 66.4                | 7.2                       | .649                          | 7.09                                          | 2.03                                                          | .800                                                      |
| 22    | 69.7                       | 4.8                 | 67.2                | 7.2                       | .667                          | 7.27                                          | 2.08                                                          | .802                                                      |
| 23    | 71.3                       | 5.0                 | 68.7                | 7.6                       | .701                          | 7.61                                          | 2.29                                                          | .790                                                      |
| 24    | 72.3                       | 4.4                 | 70.1                | 6.6                       | .733                          | 7.95                                          | 1.99                                                          | .811                                                      |
| 25    | 71.6                       | 5.2                 | 69.0                | 7.8                       | .706                          | 7.66                                          | 2.33                                                          | .786                                                      |
| 26    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 27    | 70.7                       | 3.3                 | 69.0                | 5.0                       | .706                          | 7.70                                          | 1.44                                                          | .856                                                      |
| 28    | 71.4                       | 4.9                 | 68.9                | 7.4                       | .704                          | 7.65                                          | 2.25                                                          | .799                                                      |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.967                                    | 30.161                                                 | 29.802  | 0.359   | 66.8                       | 73.6                                                     | 59.1 | 14.5  |
| 1          | .957                                      | .146                                                   | .794    | .352    | 66.0                       | 72.5                                                     | 58.2 | 14.3  |
| 2          | .950                                      | .141                                                   | .784    | .357    | 65.6                       | 72.2                                                     | 57.6 | 14.6  |
| 3          | .937                                      | .128                                                   | .771    | .357    | 64.9                       | 71.0                                                     | 56.8 | 14.2  |
| 4          | .933                                      | .115                                                   | .759    | .356    | 64.4                       | 69.7                                                     | 56.1 | 13.6  |
| 5          | .941                                      | .127                                                   | .754    | .373    | 64.0                       | 69.2                                                     | 55.9 | 13.3  |
| 6          | .956                                      | .143                                                   | .763    | .380    | 63.5                       | 68.6                                                     | 55.1 | 13.5  |
| 7          | .984                                      | .172                                                   | .800    | .372    | 63.2                       | 68.7                                                     | 55.1 | 13.6  |
| 8          | 30.012                                    | .205                                                   | .823    | .382    | 65.6                       | 72.4                                                     | 57.7 | 14.7  |
| 9          | .036                                      | .232                                                   | .860    | .372    | 69.3                       | 76.6                                                     | 61.4 | 15.2  |
| 10         | .048                                      | .242                                                   | .878    | .364    | 72.3                       | 79.0                                                     | 66.3 | 12.7  |
| 11         | .037                                      | .228                                                   | .869    | .359    | 74.4                       | 81.3                                                     | 67.4 | 13.9  |
| Noon.      | .012                                      | .202                                                   | .852    | .350    | 76.5                       | 84.2                                                     | 66.4 | 17.8  |
| 1          | 29.977                                    | .167                                                   | .812    | .355    | 78.1                       | 85.4                                                     | 66.1 | 19.3  |
| 2          | .943                                      | .129                                                   | .785    | .344    | 78.7                       | 87.0                                                     | 66.0 | 21.0  |
| 3          | .923                                      | .106                                                   | .766    | .340    | 79.3                       | 87.8                                                     | 65.6 | 22.2  |
| 4          | .912                                      | .095                                                   | .751    | .344    | 79.1                       | 87.4                                                     | 64.8 | 22.6  |
| 5          | .911                                      | .089                                                   | .741    | .348    | 77.9                       | 85.8                                                     | 64.2 | 21.6  |
| 6          | .920                                      | .088                                                   | .742    | .346    | 75.2                       | 83.7                                                     | 64.2 | 19.5  |
| 7          | .935                                      | .107                                                   | .753    | .354    | 72.8                       | 80.1                                                     | 63.8 | 16.3  |
| 8          | .953                                      | .133                                                   | .774    | .359    | 71.1                       | 78.4                                                     | 63.6 | 14.8  |
| 9          | .973                                      | .159                                                   | .794    | .365    | 69.7                       | 77.4                                                     | 62.8 | 14.6  |
| 10         | .982                                      | .168                                                   | .812    | .356    | 68.7                       | 76.8                                                     | 61.6 | 15.2  |
| 11         | .981                                      | .176                                                   | .806    | .370    | 67.6                       | 75.0                                                     | 60.2 | 14.8  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>moneter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 64.7                            | 2.0                 | 63.5                | 3.2                          | 0.592                            | 6.55                                             | 0.73                                                                    | 0.900                                                               |
| 1              | 64.2                            | 1.8                 | 63.1                | 2.9                          | .584                             | .47                                              | .65                                                                     | .910                                                                |
| 2              | 63.8                            | 1.7                 | 62.7                | 2.8                          | .577                             | .40                                              | .62                                                                     | .911                                                                |
| 3              | 63.2                            | 1.6                 | 62.2                | 2.7                          | .567                             | .30                                              | .58                                                                     | .915                                                                |
| 4              | 62.9                            | 1.5                 | 61.9                | 2.5                          | .562                             | .25                                              | .53                                                                     | .922                                                                |
| 5              | 62.5                            | 1.5                 | 61.5                | 2.5                          | .554                             | .16                                              | .52                                                                     | .922                                                                |
| 6              | 62.0                            | 1.5                 | 61.0                | 2.5                          | .546                             | .08                                              | .50                                                                     | .923                                                                |
| 7              | 61.9                            | 1.2                 | 61.1                | 2.1                          | .547                             | .10                                              | .42                                                                     | .934                                                                |
| 8              | 63.8                            | 1.8                 | 62.6                | 3.0                          | .576                             | .39                                              | .66                                                                     | .906                                                                |
| 9              | 66.0                            | 3.4                 | 64.1                | 5.2                          | .606                             | .67                                              | 1.23                                                                    | .846                                                                |
| 10             | 67.6                            | 4.7                 | 65.1                | 7.2                          | .625                             | .84                                              | 1.80                                                                    | .794                                                                |
| 11             | 68.4                            | 6.0                 | 65.4                | 9.0                          | .632                             | .89                                              | 2.33                                                                    | .750                                                                |
| Noon.          | 69.3                            | 7.2                 | 65.6                | 10.8                         | .637                             | .91                                              | 2.93                                                                    | .709                                                                |
| 1              | 70.4                            | 7.7                 | 66.6                | 11.5                         | .656                             | 7.10                                             | 3.23                                                                    | .695                                                                |
| 2              | 70.9                            | 7.8                 | 67.0                | 11.7                         | .665                             | 7.19                                             | 3.35                                                                    | .693                                                                |
| 3              | 71.3                            | 7.9                 | 67.4                | 11.9                         | .673                             | 7.26                                             | 3.46                                                                    | .688                                                                |
| 4              | 71.0                            | 8.1                 | 67.0                | 12.1                         | .664                             | 7.16                                             | 3.48                                                                    | .682                                                                |
| 5              | 70.6                            | 7.2                 | 67.0                | 10.9                         | .665                             | 7.20                                             | 3.07                                                                    | .709                                                                |
| 6              | 70.0                            | 5.2                 | 67.4                | 7.8                          | .673                             | 7.32                                             | 2.15                                                                    | .778                                                                |
| 7              | 68.9                            | 3.9                 | 66.8                | 6.0                          | .661                             | 7.22                                             | 1.57                                                                    | .824                                                                |
| 8              | 67.8                            | 3.2                 | 66.1                | 4.9                          | .645                             | 7.08                                             | 1.25                                                                    | .852                                                                |
| 9              | 66.9                            | 2.8                 | 65.3                | 4.3                          | .629                             | 6.93                                             | 1.05                                                                    | .868                                                                |
| 10             | 66.2                            | 2.5                 | 64.8                | 4.0                          | .618                             | 6.81                                             | 0.95                                                                    | .879                                                                |
| 11             | 65.3                            | 2.3                 | 63.9                | 3.7                          | .600                             | 6.63                                             | 0.86                                                                    | .886                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                              |
|-------|-----------------------|-------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inc.  |                                   |                                                                                                                         |
| 1     | 128.9                 | ..    | S. or S. W.                       | Cloudless nearly the whole day.                                                                                         |
| 2     | 121.0                 | ..    | S. or N. or N. E.                 | Cloudy.                                                                                                                 |
| 3     | 126.0                 | ..    | S. or N. W.                       | Cloudy till 2 P. M. cloudless afterwards.                                                                               |
| 4     | 125.0                 | ..    | N. W. or S. W.                    | Cloudless.                                                                                                              |
| 5     | <i>Sunday.</i>        |       |                                   |                                                                                                                         |
| 6     | 130.0                 | ..    | S or N. W. or N. E.               | Cloudy till 4 P. M. cloudless afterwards.                                                                               |
| 7     | 128.0                 | ..    | S. W. or N. or N. W.              | Cloudless.                                                                                                              |
| 8     | 128.2                 | ..    | N. W.                             | Ditto.                                                                                                                  |
| 9     | 129.0                 | ..    | W. or S. W.                       | Ditto.                                                                                                                  |
| 10    | 133.0                 | ..    | Calm or S. W.                     | Cloudless till 10 A. M. scattered $\searrow$ -i till 5 P. M. cloudless afterwards, also dense fog between 6 and 9 A. M. |
| 11    | 121.0                 | 0.16  | S. S. E.                          | Cloudy, also raining between 1 and 2 P. M.                                                                              |
| 12    | <i>Sunday.</i>        |       |                                   |                                                                                                                         |
| 13    | ....                  | ..    | S. or N.                          | Scattered $\searrow$ i and $\swarrow$ -i till 7 A. M. cloudy afterwards.                                                |
| 14    | ....                  | 0.41  | N. or N. W. or N. E.              | Cloudy and raining from noon to 3 P. M. also drizzling afterwards.                                                      |
| 15    | 134.0                 | 0.12  | W. or N. or S. W.                 | Cloudy till 5 P. M. also drizzling between midnight and 4 A. M. cloudless after 5 P. M.                                 |
| 16    | 131.0                 | ..    |                                   | Cloudless.                                                                                                              |
| 17    | 134.0                 | ..    | S. W. or N. W.                    | Ditto.                                                                                                                  |
| 18    | 136.8                 | ..    | N. W.                             | Ditto.                                                                                                                  |
| 19    | <i>Sunday.</i>        |       |                                   |                                                                                                                         |
| 20    | 135.2                 | ..    | N. W.                             | Cloudless.                                                                                                              |
| 21    | 132.5                 | ..    | S. or W. S. W.                    | Ditto.                                                                                                                  |
| 22    | 136.0                 | ..    | N. W. or S.                       | Cloudless till 6 A. M. scattered $\searrow$ i and $\swarrow$ -i or $\searrow$ -i till 3 P. M. cloudless afterwards.     |
| 23    | 134.0                 | ..    | N. W.                             | Cloudless till 3 A. M. scattered $\searrow$ i till 7 P. M. cloudless afterwards.                                        |
| 24    | 125.0                 | ..    | S.                                | Cloudless till 5 A. M. cloudy afterwards.                                                                               |
| 25    | 136.3                 | ..    | Calm or N.                        | Cloudless.                                                                                                              |
| 26    | <i>Sunday.</i>        | 0.32  |                                   |                                                                                                                         |
| 27    | 134.8                 | ..    | N. W.                             | Nearly cloudless.                                                                                                       |
| 28    | 135.0                 | ..    | Calm or S. S. W. or W.            | Cloudless.                                                                                                              |

$\searrow$ i Cirri,  $\swarrow$ i cumuli, —i strati,  $\swarrow$ -i cirrocumuli,  $\searrow$ -i cirro strati,  $\swarrow$ -i cumulo strati,  $\swarrow$ -i Nimbi.



*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.391     | 76.0         | 76.5    | 56.6      | ..                   | ..       | W.                     | Clear                |
| 2     | 29.455     | 73.0         | 74.5    | 64.9      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.419     | 72.0         | 72.8    | 62.1      | ..                   | ..       | S.                     | Ditto                |
| 4     | 29.373     | 77.4         | 78.6    | 61.0      | ..                   | ..       | S. E.                  | Ditto                |
| 5     | 29.389     | 73.0         | 73.6    | 61.0      | ..                   | ..       | E.                     | Ditto                |
| 6     | 29.547     | 71.8         | 72.3    | 54.4      | ..                   | ..       | N. W.                  | Hazy                 |
| 7     | 29.573     | 66.5         | 67.5    | 54.0      | ..                   | ..       | N. W.                  | Clear                |
| 8     | 29.491     | 66.0         | 68.0    | 52.0      | ..                   | ..       | N. W.                  | Hazy                 |
| 9     | 29.559     | 66.9         | 68.0    | 55.6      | ..                   | ..       | W.                     | Clear                |
| 10    | 29.599     | 68.0         | 69.2    | 52.8      | ..                   | ..       | W.                     | Ditto                |
| 11    | 29.571     | 73.0         | 74.3    | 57.2      | ..                   | ..       | N. W.                  | ∩ scattered          |
| 12    | 29.507     | 76.8         | 77.2    | 60.0      | ..                   | ..       | W.                     | Clear                |
| 13    | 29.479     | 79.8         | 82.0    | 63.0      | ..                   | ..       | W.                     | Ditto                |
| 14    | 29.515     | 77.0         | 77.0    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 15    | 29.512     | 73.0         | 73.2    | 53.0      | ..                   | ..       | N. W.                  | Ditto                |
| 16    | 29.497     | 72.5         | 74.5    | 54.0      | ..                   | ..       | N. W.                  | Clear                |
| 17    | 29.539     | 72.9         | 75.4    | 65.5      | ..                   | ..       | E.                     | Ditto                |
| 18    | 29.539     | 72.5         | 73.8    | 55.0      | ..                   | ..       | N. W.                  | ∩ very few scattered |
| 19    | 29.567     | 74.0         | 74.8    | 56.0      | ..                   | ..       | W.                     | ∩ scattered          |
| 20    | 29.553     | 79.0         | 81.0    | 59.0      | ..                   | ..       | E.                     | ∩ ditto              |
| 21    | 29.553     | 81.0         | 83.4    | 60.5      | ..                   | ..       | E.                     | Ditto                |
| 22    | 29.585     | 81.0         | 83.5    | 62.0      | ..                   | ..       | N.                     | Ditto                |
| 23    | 29.555     | 82.5         | 83.5    | 61.8      | ..                   | ..       | N.                     | Hazy                 |
| 24    | 29.563     | 82.9         | 84.4    | 65.0      | ..                   | ..       | S. E.                  | ∩ scattered          |
| 25    | 29.595     | 78.3         | 78.3    | 62.0      | ..                   | ..       | N. W.                  | ∩ all over           |
| 26    | 29.569     | 80.2         | 80.8    | 60.0      | ..                   | ..       | N.                     | Clear                |
| 27    | 29.529     | 83.4         | 84.9    | 62.8      | ..                   | ..       | N.                     | Ditto                |
| 28    | 29.479     | 81.0         | 82.0    | 64.7      | ..                   | ..       | N. W.                  | Ditto                |
| 29    | 29.433     | 84.0         | 86.0    | 63.3      | ..                   | ..       | N. W.                  | Ditto                |
| 30    | 29.409     | 83.9         | 86.5    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 31    | 29.415     | 88.6         | 88.8    | 64.5      | ..                   | ..       | W.                     | Ditto                |
| Mean. | 29.508     | 76.4         | 77.6    | 59.4      | ..                   | ..       | ..                     | .....                |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6 at times it is far greater.

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.359     | 81.0         | 81.5    | 60.0      | ..                   | ..       | W.                     | Clear                |
| 2     | 29.425     | 78.0         | 79.0    | 64.9      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.367     | 78.7         | 79.9    | 59.7      | ..                   | ..       | S. W.                  | Ditto                |
| 4     | 29.345     | 82.0         | 83.5    | 64.6      | ..                   | ..       | S. E.                  | Ditto                |
| 5     | 29.357     | 76.8         | 77.1    | 64.0      | ..                   | ..       | E.                     | ∪ a few scattered    |
| 6     | 29.529     | 75.0         | 75.3    | 55.5      | ..                   | ..       | N. W.                  | Hazy                 |
| 7     | 29.547     | 70.3         | 71.2    | 51.0      | ..                   | ..       | N. W.                  | Clear                |
| 8     | 29.471     | 74.0         | 74.3    | 54.5      | ..                   | ..       | N. W.                  | Hazy                 |
| 9     | 29.535     | 72.0         | 73.0    | 54.5      | ..                   | ..       | W.                     | Clear                |
| 10    | 29.563     | 72.9         | 74.1    | 52.8      | ..                   | ..       | W.                     | Ditto                |
| 11    | 29.539     | 78.7         | 80.5    | 58.0      | ..                   | ..       | N. W.                  | ∪ scattered          |
| 12    | 29.491     | 85.0         | 87.0    | 63.5      | ..                   | ..       | W.                     | Clear                |
| 13    | 29.459     | 86.7         | 87.3    | 64.5      | ..                   | ..       | W.                     | Ditto                |
| 14    | 29.481     | 81.5         | 82.0    | 64.6      | ..                   | ..       | N. W.                  | ∪ scattered          |
| 15    | 29.475     | 76.8         | 78.0    | 54.0      | ..                   | ..       | N. W.                  | Clear                |
| 16    | 29.485     | 76.7         | 77.4    | 54.8      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.535     | 77.8         | 78.2    | 56.6      | ..                   | ..       | W.                     | Ditto                |
| 18    | 29.525     | 77.9         | 78.5    | 56.4      | ..                   | ..       | W.                     | ∪ very few scattered |
| 19    | 29.533     | 77.6         | 78.5    | 56.9      | ..                   | ..       | N. W.                  | ∪ scattered          |
| 20    | 29.531     | 82.3         | 83.8    | 59.7      | ..                   | ..       | E.                     | ∪ scattered all over |
| 21    | 29.525     | 85.5         | 87.0    | 61.6      | ..                   | ..       | E.                     | ∪ scattered          |
| 22    | 29.565     | 85.5         | 88.4    | 63.3      | ..                   | ..       | N.                     | Ditto                |
| 23    | 29.551     | 87.2         | 90.0    | 63.0      | ..                   | ..       | N. W.                  | ∪ scat. towards S.   |
| 24    | 29.539     | 87.5         | 88.5    | 65.5      | ..                   | ..       | S. E.                  | ∪ scattered          |
| 25    | 29.575     | 82.7         | 84.7    | 63.4      | ..                   | ..       | N.                     | ∪ scattered          |
| 26    | 29.519     | 84.5         | 85.2    | 62.0      | ..                   | ..       | N.                     | Clear                |
| 27    | 29.497     | 87.5         | 88.2    | 65.3      | ..                   | ..       | N.                     | Ditto                |
| 28    | 29.449     | 84.8         | 85.7    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 29    | 29.417     | 86.7         | 87.9    | 54.0      | ..                   | ..       | N. W.                  | Ditto                |
| 30    | 29.385     | 88.0         | 89.2    | 64.1      | ..                   | ..       | N. W.                  | Ditto                |
| 31    | 29.381     | 92.5         | 94.3    | 65.5      | ..                   | ..       | W.                     | Ditto                |
| Mean. | 29.482     | 81.1         | 82.2    | 66.2      | ..                   | ..       | ..                     | .....                |

Barometer observations corrected for capillarity only.

Symbols. {  
 ∪ Cirris.  
 ∪ Cirro strata.  
 ∪ Cumuli.  
 ∪ Cumulo strata.  
 ∪ Nimbi or Nimbus.

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | 3 Ft. 2 In. from the ground. | Rain Gauges. | Direction of the Wind. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|--------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                              |              |                        |
| 1     | 29.317     | 84.8         | 84.5    | 64.0      | 85.0                 | 64.0     | 74.5  | Clear              | ..                           | W.           |                        |
| 2     | 29.375     | 82.5         | 82.0    | 61.0      | 81.5                 | 63.5     | 72.5  | Ditto              | ..                           | N.W.         |                        |
| 3     | 29.313     | 82.0         | 83.0    | 62.2      | 82.3                 | 63.0     | 72.65 | Ditto              | ..                           | S.W.         |                        |
| 4     | 29.267     | 89.0         | 88.5    | 71.6      | 88.5                 | 63.9     | 76.2  | Ditto              | ..                           | S.E.         |                        |
| 5     | 29.311     | 79.5         | 80.2    | 70.6      | 81.0                 | 62.0     | 71.5  | ~ a few scatd.     | ..                           | E.           |                        |
| 6     | 29.483     | 78.9         | 77.5    | 56.0      | 78.0                 | 61.9     | 69.95 | Hazy               | ..                           | N.W.         |                        |
| 7     | 29.477     | 76.6         | 76.2    | 55.0      | 75.5                 | 50.5     | 63.0  | Clear              | ..                           | N.W.         |                        |
| 8     | 29.411     | 74.8         | 73.0    | 57.8      | 74.7                 | 54.0     | 64.35 | ~ all over         | ..                           | N.           |                        |
| 9     | 29.505     | 77.0         | 76.8    | 55.5      | 76.0                 | 55.0     | 65.5  | Clear              | ..                           | W.           |                        |
| 10    | 29.497     | 79.8         | 80.8    | 61.4      | 79.5                 | 55.0     | 67.25 | ~ scatd. in z.     | ..                           | W.           |                        |
| 11    | 29.475     | 86.5         | 87.4    | 63.5      | 86.2                 | 61.0     | 73.6  | Scattered          | ..                           | N.W.         |                        |
| 12    | 29.453     | 90.0         | 90.6    | 67.2      | 91.5                 | 69.0     | 80.25 | Clear              | ..                           | W.           |                        |
| 13    | 29.395     | 91.0         | 91.0    | 69.5      | 90.5                 | 68.0     | 79.25 | Hazy               | ..                           | W.           |                        |
| 14    | 29.433     | 86.5         | 86.0    | 63.9      | 88.5                 | 66.5     | 77.5  | Scattered          | ..                           | N.W.         |                        |
| 15    | 29.381     | 83.3         | 83.0    | 56.5      | 83.0                 | 61.5     | 72.25 | Clear              | ..                           | N.W.         |                        |
| 16    | 29.409     | 82.5         | 82.5    | 57.4      | 82.0                 | 58.8     | 70.4  | ~ scattered        | ..                           | N.W.         |                        |
| 17    | 29.489     | 84.8         | 84.8    | 57.8      | 84.0                 | 58.5     | 71.25 | Clear [scatd.      | ..                           | N.W.         |                        |
| 18    | 29.453     | 85.0         | 85.2    | 58.2      | 84.5                 | 60.5     | 72.5  | ~ very few         | ..                           | W.           |                        |
| 19    | 29.469     | 88.5         | 89.2    | 59.0      | 89.5                 | 60.5     | 75.0  | ~ scatd. [o'er     | ..                           | N.W.         |                        |
| 20    | 29.449     | 86.5         | 87.2    | 65.5      | 86.5                 | 61.0     | 73.75 | ~ scatd. all       | ..                           | E.           |                        |
| 21    | 29.451     | 89.5         | 90.5    | 64.0      | 90.0                 | 67.0     | 78.5  | ~ scattered        | ..                           | S.E.         |                        |
| 22    | 29.485     | 91.0         | 91.5    | 66.8      | 91.0                 | 66.0     | 78.5  | Ditto              | ..                           | S.           |                        |
| 23    | 29.517     | 93.0         | 93.4    | 67.0      | 92.5                 | 71.0     | 81.75 | Ditto              | ..                           | N.W.         |                        |
| 24    | 29.505     | 88.0         | 86.8    | 66.9      | 86.0                 | 71.5     | 78.75 | ~ all over         | ..                           | N.W.         |                        |
| 25    | 29.505     | 88.5         | 88.4    | 66.7      | 87.5                 | 71.5     | 79.5  | Clear              | ..                           | N.W.         |                        |
| 26    | 29.465     | 90.6         | 91.2    | 64.0      | 91.2                 | 66.0     | 78.6  | Ditto              | ..                           | N.           |                        |
| 27    | 29.421     | 94.2         | 94.0    | 65.8      | 93.5                 | 67.0     | 80.25 | Clear              | ..                           | N.W.         |                        |
| 28    | 29.385     | 90.4         | 90.5    | 63.5      | 90.0                 | 68.0     | 79.0  | Ditto              | ..                           | N.W.         |                        |
| 29    | 29.335     | 92.9         | 93.5    | 65.3      | 92.5                 | 69.0     | 80.75 | Ditto              | ..                           | N.W.         |                        |
| 30    | 29.337     | 94.0         | 95.5    | 66.0      | 94.4                 | 70.0     | 82.2  | Ditto              | ..                           | N.W.         |                        |
| 31    | 29.311     | 98.2         | 99.9    | 77.4      | 98.4                 | 75.5     | 86.95 | Ditto              | ..                           | W.           |                        |
| Mn.   | 29.422     | 86.4         | 86.6    | 63.5      | 85.6                 | 64.6     | 75.1  | ....               | ..                           | ..           |                        |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of April, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.439     | 87.9         | 89.5    | 65.0      | ..                   | ..       | E.                     | Clear              |
| 2     | 29.427     | 89.5         | 90.2    | 66.0      | ..                   | ..       | E.                     | Ditto              |
| 3     | 29.383     | 92.0         | 93.2    | 66.3      | ..                   | ..       | W.                     | Ditto              |
| 4     | 29.329     | 90.5         | 92.0    | 65.0      | ..                   | ..       | S. W.                  | ✓ scattered        |
| 5     | 29.367     | 92.2         | 93.0    | 68.5      | ..                   | ..       | W.                     | Clear              |
| 6     | 29.277     | 94.0         | 94.8    | 66.0      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 7     | 29.279     | 92.0         | 91.8    | 72.3      | ..                   | ..       | N.                     | Clear              |
| 8     | 29.277     | 91.0         | 91.6    | 65.9      | ..                   | ..       | W.                     | Ditto              |
| 9     | 29.289     | 89.0         | 89.6    | 62.8      | ..                   | ..       | N.                     | ✓ scattered        |
| 10    | 29.309     | 86.0         | 87.0    | 61.0      | ..                   | ..       | N. W.                  | Clear              |
| 11    | 29.333     | 86.0         | 87.4    | 61.5      | ..                   | ..       | N. W.                  | Ditto              |
| 12    | 29.401     | 84.0         | 83.5    | 65.5      | ..                   | ..       | N. E.                  | ✓ all over         |
| 13    | 29.305     | 89.0         | 89.8    | 64.5      | ..                   | ..       | N. W.                  | Clear              |
| 14    | 29.299     | 90.1         | 91.0    | 65.0      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 15    | 29.269     | 87.8         | 89.2    | 62.3      | ..                   | ..       | N. W.                  | Clear              |
| 16    | 29.309     | 86.0         | 86.8    | 60.6      | ..                   | ..       | N. W.                  | ~ a few to N.      |
| 17    | 29.357     | 85.0         | 86.4    | 59.0      | ..                   | ..       | N. W.                  | Clear              |
| 18    | 29.389     | 87.8         | 89.0    | 62.0      | ..                   | ..       | N. W.                  | Ditto              |
| 19    | 29.383     | 87.5         | 88.0    | 60.3      | ..                   | ..       | N.                     | ✓ all over         |
| 20    | 29.329     | 88.9         | 90.0    | 65.4      | ..                   | ..       | E.                     | Clear              |
| 21    | 29.295     | 93.5         | 94.4    | 67.0      | ..                   | ..       | N. W.                  | Ditto              |
| 22    | 29.311     | 92.0         | 93.4    | 63.7      | ..                   | ..       | N.                     | Ditto              |
| 23    | 29.305     | 92.0         | 92.8    | 64.0      | ..                   | ..       | N. W.                  | Ditto              |
| 24    | 29.283     | 91.3         | 92.2    | 63.9      | ..                   | ..       | N. W.                  | Ditto              |
| 25    | 29.355     | 94.5         | 95.8    | 71.4      | ..                   | ..       | N. E.                  | Ditto              |
| 26    | 29.339     | 97.0         | 98.0    | 67.5      | ..                   | ..       | N. W.                  | Ditto              |
| 27    | 29.397     | 97.0         | 98.0    | 65.0      | ..                   | ..       | N. W.                  | Ditto              |
| 28    | 29.299     | 94.0         | 95.9    | 63.3      | ..                   | ..       | N. W.                  | Ditto              |
| 29    | 29.253     | 93.0         | 93.9    | 64.0      | ..                   | ..       | N. W.                  | Ditto              |
| 30    | 29.425     | 94.0         | 94.6    | 63.0      | ..                   | ..       | N.                     | Ditto              |
| Mean. | 29.333     | 90.4         | 91.4    | 64.5      | ..                   | ..       | ..                     | ..                 |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of April, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.           |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|------------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                              |
| 1     | 29.405     | 91.5         | 94.4    | 66.4      | ..                   | ..       | E.                     | Clear                        |
| 2     | 29.391     | 92.6         | 93.2    | 67.0      | ..                   | ..       | N. E.                  | Ditto                        |
| 3     | 29.351     | 96.7         | 98.8    | 67.0      | ..                   | ..       | W.                     | Ditto                        |
| 4     | 29.291     | 99.5         | 101.3   | 66.5      | ..                   | ..       | W.                     | Ditto                        |
| 5     | 29.349     | 97.4         | 98.7    | 69.0      | ..                   | ..       | N. W.                  | Ditto                        |
| 6     | 29.233     | 99.0         | 99.8    | 67.7      | ..                   | ..       | N. W.                  | ✓ very few scattered         |
| 7     | 29.253     | 95.4         | 94.9    | 73.0      | ..                   | ..       | N.                     | ✓ scattered in zenith        |
| 8     | 29.237     | 94.6         | 94.4    | 68.9      | ..                   | ..       | W.                     | Clear                        |
| 9     | 29.257     | 93.4         | 94.2    | 64.0      | ..                   | ..       | N. W.                  | scattered                    |
| 10    | 29.295     | 91.0         | 91.6    | 63.4      | ..                   | ..       | N. W.                  | Clear                        |
| 11    | 29.301     | 90.6         | 91.5    | 62.8      | ..                   | ..       | N. W.                  | ✓ towards W.                 |
| 12    | 29.271     | 89.8         | 91.4    | 67.3      | ..                   | ..       | S. E.                  | ✓ towards N.<br>✓ towards E. |
| 13    | 29.285     | 92.0         | 92.7    | 67.0      | ..                   | ..       | N. W.                  | ✓ scattered                  |
| 14    | 29.271     | 93.0         | 94.2    | 67.5      | ..                   | ..       | N. W.                  | Ditto                        |
| 15    | 29.239     | 92.5         | 94.1    | 67.0      | ..                   | ..       | N. W.                  | Ditto                        |
| 16    | 29.275     | 90.5         | 91.1    | 66.0      | ..                   | ..       | N. W.                  | ✓ a few to N.                |
| 17    | 29.341     | 90.0         | 90.7    | 61.5      | ..                   | ..       | N.                     | Clear                        |
| 18    | 29.363     | 92.5         | 92.7    | 62.4      | ..                   | ..       | N. W.                  | Ditto                        |
| 19    | 29.331     | 90.1         | 92.7    | 64.3      | ..                   | ..       | N. E.                  | ✓ all over                   |
| 20    | 29.307     | 94.0         | 95.6    | 71.6      | ..                   | ..       | E.                     | Clear                        |
| 21    | 29.273     | 98.4         | 99.8    | 64.5      | ..                   | ..       | N. W.                  | Ditto                        |
| 22    | 29.281     | 98.2         | 98.6    | 64.0      | ..                   | ..       | N.                     | Ditto                        |
| 23    | 29.283     | 98.5         | 99.2    | 65.0      | ..                   | ..       | N. W.                  | Ditto                        |
| 24    | 29.271     | 96.0         | 97.8    | 63.0      | ..                   | ..       | N. W.                  | Ditto                        |
| 25    | 29.345     | 98.9         | 100.4   | 71.5      | ..                   | ..       | N. E.                  | Ditto                        |
| 26    | 29.321     | 101.7        | 102.7   | 70.0      | ..                   | ..       | N. W.                  | Ditto                        |
| 27    | 29.381     | 99.0         | 100.2   | 67.6      | ..                   | ..       | N. W.                  | Ditto                        |
| 28    | 29.263     | 98.9         | 98.5    | 70.0      | ..                   | ..       | N. W.                  | Ditto                        |
| 29    | 29.237     | 96.8         | 97.5    | 70.0      | ..                   | ..       | S.                     | Ditto                        |
| 30    | 29.371     | 97.6         | 98.0    | 64.8      | ..                   | ..       | N.                     | Ditto                        |
| Mean. | 29.302     | 95.0         | 96.0    | 66.6      | ..                   | ..       | ..                     | ..                           |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of April, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.    | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|-----------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                       | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.339     | 98.9         | 99.5    | 73.0      | 98.8                 | 74.0     | 86.4  | Clear                 | ..                           | N.                     |
| 2     | 29.325     | 99.5         | 100.6   | 70.0      | 100.0                | 75.0     | 87.5  | Ditto                 | ..                           | N. E.                  |
| 3     | 29.271     | 103.0        | 102.8   | 67.5      | 102.0                | 74.0     | 88.0  | Ditto                 | ..                           | N.W.                   |
| 4     | 29.251     | 100.5        | 99.5    | 69.5      | 101.0                | 79.0     | 90.0  | Hazy                  | ..                           | N.                     |
| 5     | 29.261     | 101.5        | 101.5   | 71.4      | 101.0                | 83.5     | 92.25 | Ditto                 | ..                           | N.W.                   |
| 6     | 29.171     | 101.0        | 100.5   | 69.8      | 102.0                | 83.5     | 92.75 | ~ all over            | ..                           | N.W.                   |
| 7     | 29.197     | 99.0         | 98.6    | 76.5      | 98.0                 | 83.0     | 90.85 | ~ scattered in zenith | ..                           | N.W.                   |
| 8     | 29.135     | 99.5         | 98.0    | 69.5      | 98.0                 | 81.9     | 89.95 | ~ in zenith           | ..                           | N.W.                   |
| 9     | 29.203     | 96.8         | 97.2    | 64.8      | 98.0                 | 78.0     | 88.0  | ~ scattered           | ..                           | W.                     |
| 10    | 29.243     | 93.1         | 91.5    | 63.5      | 93.0                 | 75.8     | 84.4  | Hazy [W.              | ..                           | N.                     |
| 11    | 29.244     | 96.4         | 95.8    | 65.3      | 97.0                 | 72.5     | 84.75 | ~ towards             | ..                           | N.W.                   |
| 12    | 29.211     | 96.5         | 97.0    | 69.2      | 96.0                 | 80.5     | 88.25 | ~ all over            | ..                           | N.                     |
| 13    | 29.215     | 93.4         | 93.5    | 66.9      | 96.0                 | 76.5     | 86.25 | ~ to E. and N.        | ..                           | N.W.                   |
| 14    | 29.225     | 97.2         | 97.0    | 69.0      | 96.3                 | 81.0     | 88.65 | ~ scattered           | ..                           | N.W.                   |
| 15    | 29.181     | 95.2         | 94.5    | 65.0      | 95.0                 | 74.5     | 84.75 | ~ ditto               | ..                           | N.W.                   |
| 16    | 29.207     | 94.0         | 94.5    | 67.0      | 95.0                 | 72.6     | 83.8  | ~ a few to N.         | ..                           | N.                     |
| 17    | 29.289     | 94.0         | 94.6    | 62.0      | 93.5                 | 71.0     | 82.25 | Clear                 | ..                           | W.                     |
| 18    | 29.305     | 98.5         | 98.5    | 65.9      | 98.0                 | 72.0     | 85.0  | Ditto                 | ..                           | N.W.                   |
| 19    | 29.241     | 97.0         | 97.5    | 69.0      | 97.0                 | 78.0     | 87.5  | ~ to E. and W.        | ..                           | N. E.                  |
| 20    | 29.225     | 99.8         | 98.5    | 71.7      | 98.0                 | 76.5     | 87.25 | Clear                 | ..                           | E.                     |
| 21    | 29.183     | 101.1        | 101.3   | 68.0      | 100.5                | 80.5     | 90.5  | Ditto                 | ..                           | N.W.                   |
| 22    | 29.181     | 101.7        | 101.6   | 66.0      | 100.0                | 77.0     | 88.5  | Ditto                 | ..                           | N.W.                   |
| 23    | 29.171     | 102.2        | 102.9   | 67.0      | 102.0                | 78.0     | 90.0  | Ditto                 | ..                           | N.W.                   |
| 24    | 29.211     | 102.9        | 103.5   | 67.0      | 102.5                | 79.0     | 90.75 | Ditto                 | ..                           | N.W.                   |
| 25    | 29.273     | 102.0        | 102.5   | 72.0      | 102.0                | 85.5     | 93.75 | Ditto                 | ..                           | N.E.                   |
| 26    | 29.243     | 105.6        | 106.0   | 71.9      | 107.8                | 83.5     | 95.65 | Ditto                 | ..                           | N.W.                   |
| 27    | 29.309     | 103.0        | 102.7   | 66.2      | 103.7                | 81.5     | 92.6  | Ditto                 | ..                           | N.W.                   |
| 28    | 29.163     | 103.1        | 102.5   | 65.5      | 101.5                | 78.5     | 90.0  | Ditto                 | ..                           | N.W.                   |
| 29    | 29.197     | 100.5        | 99.7    | 66.0      | 99.0                 | 78.5     | 88.75 | Ditto                 | ..                           | N.W.                   |
| 30    | 29.219     | 101.7        | 102.0   | 67.5      | 101.5                | 79.0     | 90.25 | Ditto                 | ..                           | N.W.                   |
| Mn.   | 29.229     | 99.2         | 99.1    | 68.1      | 99.1                 | 78.1     | 88.63 | ..                    | ..                           | ..                     |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|---------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                        | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                           | o    | o     |
| 1     | 29.846                                          | 29.928                                    | 29.775  | .153    | 76.8                          | 88.2                                        | 66.0 | 22.2  |
| 2     | .780                                            | .867                                      | .683    | .184    | 78.8                          | 87.6                                        | 72.8 | 14.8  |
| 3     | .814                                            | .904                                      | .752    | .152    | 78.9                          | 89.2                                        | 69.9 | 19.3  |
| 4     | .838                                            | .913                                      | .785    | .128    | 79.7                          | 90.5                                        | 73.9 | 16.6  |
| 5     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 6     | .826                                            | .894                                      | .765    | .129    | 82.1                          | 94.8                                        | 72.9 | 21.9  |
| 7     | .813                                            | .890                                      | .759    | .131    | 82.2                          | 92.9                                        | 72.9 | 20.0  |
| 8     | .868                                            | .969                                      | .787    | .182    | 77.2                          | 85.9                                        | 70.4 | 15.5  |
| 9     | .889                                            | .969                                      | .824    | .145    | 76.9                          | 87.4                                        | 67.2 | 20.2  |
| 10    | .927                                            | 30.017                                    | .868    | .149    | 74.4                          | 83.6                                        | 66.7 | 16.9  |
| 11    | .947                                            | .035                                      | .876    | .159    | 73.8                          | 84.8                                        | 63.4 | 21.4  |
| 12    | <i>Sunday</i>                                   |                                           |         |         |                               |                                             |      |       |
| 13    | .814                                            | 29.884                                    | .735    | .149    | 80.1                          | 93.6                                        | 71.0 | 22.6  |
| 14    | .799                                            | .892                                      | .712    | .180    | 82.1                          | 95.6                                        | 70.7 | 24.9  |
| 15    | .817                                            | .898                                      | .753    | .145    | 81.6                          | 92.6                                        | 72.4 | 20.2  |
| 16    | .850                                            | .927                                      | .787    | .140    | 81.5                          | 92.5                                        | 70.6 | 21.9  |
| 17    | .882                                            | .955                                      | .826    | .129    | 81.1                          | 90.1                                        | 75.4 | 14.7  |
| 18    | .898                                            | .974                                      | .824    | .150    | 80.1                          | 88.4                                        | 72.8 | 15.6  |
| 19    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 20    | .925                                            | .989                                      | .862    | .127    | 80.4                          | 89.2                                        | 74.0 | 15.2  |
| 21    | .928                                            | 30.012                                    | .869    | .143    | 82.3                          | 93.0                                        | 74.0 | 19.0  |
| 22    | .967                                            | .046                                      | .889    | .157    | 83.3                          | 95.0                                        | 74.4 | 20.6  |
| 23    | .935                                            | .017                                      | .850    | .167    | 82.0                          | 94.6                                        | 73.8 | 20.8  |
| 24    | .891                                            | 29.977                                    | .816    | .161    | 83.8                          | 96.6                                        | 75.6 | 21.0  |
| 25    | .886                                            | .978                                      | .810    | .168    | 83.3                          | 94.2                                        | 76.2 | 18.0  |
| 26    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 27    | .889                                            | .969                                      | .799    | .170    | 85.5                          | 95.4                                        | 78.8 | 16.6  |
| 28    | .849                                            | .923                                      | .758    | .165    | 84.0                          | 94.8                                        | 77.4 | 17.4  |
| 29    | .802                                            | .892                                      | .661    | .231    | 80.5                          | 92.2                                        | 70.7 | 21.5  |
| 30    | .809                                            | .880                                      | .700    | .180    | 75.0                          | 87.6                                        | 69.0 | 18.6  |
| 31    | .855                                            | .928                                      | .796    | .132    | 76.0                          | 85.4                                        | 66.9 | 18.5  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 70.7                            | 6.1                 | 67.6                | 9.1                          | .6777                            | 7.35                                             | 2.70                                                                    | .755                                                                |
| 2     | 75.9                            | 2.9                 | 74.5                | 4.4                          | .842                             | 9.11                                             | 1.46                                                                    | .875                                                                |
| 3     | 73.9                            | 5.0                 | 71.3                | 7.6                          | .760                             | 8.22                                             | 2.43                                                                    | .797                                                                |
| 4     | 76.8                            | 2.9                 | 75.3                | 4.4                          | .865                             | 9.33                                             | 1.54                                                                    | .873                                                                |
| 5     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 6     | 77.9                            | 4.2                 | 75.8                | 6.3                          | .879                             | 9.44                                             | 2.35                                                                    | .831                                                                |
| 7     | 75.5                            | 6.7                 | 72.2                | 10.1                         | .781                             | 8.38                                             | 3.39                                                                    | .735                                                                |
| 8     | 67.5                            | 9.7                 | 62.6                | 14.6                         | .573                             | 6.21                                             | 3.83                                                                    | .634                                                                |
| 9     | 70.0                            | 6.9                 | 66.5                | 10.4                         | .651                             | 7.07                                             | 2.99                                                                    | .729                                                                |
| 10    | 67.5                            | 7.0                 | 63.8                | 10.6                         | .595                             | 6.49                                             | 2.80                                                                    | .717                                                                |
| 11    | 65.6                            | 8.2                 | 61.3                | 12.5                         | .550                             | 5.99                                             | 3.19                                                                    | .675                                                                |
| 12    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 13    | 73.0                            | 7.1                 | 69.5                | 10.7                         | .715                             | 7.71                                             | 3.44                                                                    | .736                                                                |
| 14    | 74.0                            | 8.1                 | 69.9                | 12.1                         | .726                             | 7.81                                             | 4.02                                                                    | .707                                                                |
| 15    | 73.6                            | 8.0                 | 69.6                | 12.1                         | .719                             | 7.74                                             | 3.82                                                                    | .707                                                                |
| 16    | 75.1                            | 6.4                 | 71.8                | 9.7                          | .774                             | 8.32                                             | 3.22                                                                    | .754                                                                |
| 17    | 77.5                            | 3.6                 | 75.7                | 5.4                          | .876                             | 9.43                                             | 1.87                                                                    | .848                                                                |
| 18    | 76.6                            | 3.5                 | 74.8                | 5.3                          | .853                             | 9.19                                             | 1.79                                                                    | .850                                                                |
| 19    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 20    | 76.7                            | 3.7                 | 74.9                | 5.6                          | .851                             | 9.18                                             | 1.90                                                                    | .845                                                                |
| 21    | 76.7                            | 5.6                 | 73.9                | 8.4                          | .825                             | 8.86                                             | 2.91                                                                    | .779                                                                |
| 22    | 77.0                            | 6.3                 | 73.8                | 9.4                          | .823                             | 8.83                                             | 3.34                                                                    | .760                                                                |
| 23    | 76.7                            | 5.3                 | 74.1                | 8.0                          | .831                             | 8.93                                             | 2.78                                                                    | .789                                                                |
| 24    | 79.6                            | 4.2                 | 77.5                | 6.3                          | .926                             | 9.92                                             | 2.43                                                                    | .829                                                                |
| 25    | 79.3                            | 4.1                 | 77.2                | 6.2                          | .918                             | 9.84                                             | 2.29                                                                    | .832                                                                |
| 26    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 27    | 80.7                            | 4.7                 | 78.4                | 7.1                          | .951                             | 10.16                                            | 2.73                                                                    | .810                                                                |
| 28    | 79.3                            | 4.7                 | 76.9                | 7.1                          | .909                             | 9.74                                             | 2.60                                                                    | .811                                                                |
| 29    | 75.0                            | 5.5                 | 72.2                | 8.3                          | .787                             | 8.47                                             | 2.72                                                                    | .772                                                                |
| 30    | 71.2                            | 3.8                 | 69.3                | 5.7                          | .715                             | 7.78                                             | 1.72                                                                    | .839                                                                |
| 31    | 71.8                            | 4.2                 | 69.7                | 6.3                          | .722                             | 7.85                                             | 1.92                                                                    | .823                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.871                                    | 29.980                                                 | 29.772  | 0.208   | 75.3                       | 80.2                                                     | 69.1 | 11.1  |
| 1          | .861                                      | .976                                                   | .773    | .203    | 74.6                       | 79.9                                                     | 68.0 | 11.9  |
| 2          | .847                                      | .955                                                   | .761    | .194    | 74.0                       | 79.2                                                     | 67.7 | 11.5  |
| 3          | .836                                      | .954                                                   | .752    | .202    | 73.6                       | 79.2                                                     | 66.2 | 13.0  |
| 4          | .838                                      | .987                                                   | .754    | .233    | 73.0                       | 79.2                                                     | 65.0 | 14.2  |
| 5          | .843                                      | .983                                                   | .761    | .222    | 72.6                       | 79.2                                                     | 64.3 | 14.9  |
| 6          | .867                                      | .991                                                   | .794    | .197    | 72.3                       | 78.8                                                     | 63.6 | 15.2  |
| 7          | .893                                      | 30.028                                                 | .814    | .214    | 72.2                       | 79.2                                                     | 63.4 | 15.8  |
| 8          | .919                                      | .015                                                   | .834    | .181    | 75.2                       | 81.0                                                     | 67.5 | 13.5  |
| 9          | .937                                      | .033                                                   | .849    | .184    | 78.8                       | 84.4                                                     | 72.9 | 11.5  |
| 10         | .942                                      | .045                                                   | .847    | .193    | 82.0                       | 87.6                                                     | 75.9 | 11.7  |
| 11         | .932                                      | .036                                                   | .846    | .190    | 85.0                       | 90.9                                                     | 79.2 | 11.7  |
| Noon.      | .905                                      | .009                                                   | .803    | .206    | 87.4                       | 93.5                                                     | 81.3 | 12.2  |
| 1          | .872                                      | 29.981                                                 | .767    | .214    | 89.3                       | 94.1                                                     | 82.4 | 11.7  |
| 2          | .838                                      | .949                                                   | .727    | .222    | 90.3                       | 94.9                                                     | 82.8 | 12.1  |
| 3          | .817                                      | .925                                                   | .708    | .217    | 90.6                       | 95.8                                                     | 83.6 | 12.2  |
| 4          | .800                                      | .911                                                   | .683    | .228    | 90.2                       | 96.6                                                     | 83.6 | 13.0  |
| 5          | .795                                      | .889                                                   | .661    | .228    | 88.1                       | 94.0                                                     | 80.8 | 13.2  |
| 6          | .806                                      | .899                                                   | .685    | .214    | 84.7                       | 90.8                                                     | 68.5 | 22.3  |
| 7          | .827                                      | .919                                                   | .713    | .206    | 82.1                       | 87.2                                                     | 69.6 | 17.6  |
| 8          | .853                                      | .944                                                   | .735    | .209    | 80.3                       | 84.4                                                     | 69.0 | 15.4  |
| 9          | .880                                      | .971                                                   | .750    | .221    | 78.4                       | 82.6                                                     | 69.5 | 13.1  |
| 10         | .897                                      | 30.046                                                 | .781    | .265    | 77.1                       | 82.2                                                     | 69.0 | 13.2  |
| 11         | .885                                      | 29.976                                                 | .780    | .196    | 76.0                       | 81.2                                                     | 69.4 | 11.8  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 72.5                            | 2.8                 | 71.0                | 4.2                          | 0.758                            | 8.25                                             | 1.17                                                                    | 0.875                                                               |
| 1              | 72.2                            | 2.4                 | 70.9                | 3.7                          | .755                             | 8.23                                             | 1.01                                                                    | .889                                                                |
| 2              | 71.8                            | 2.2                 | 70.6                | 3.4                          | .749                             | 8.17                                             | 0.91                                                                    | .897                                                                |
| 3              | 71.4                            | 2.2                 | 70.3                | 3.3                          | .741                             | 8.09                                             | 0.86                                                                    | .901                                                                |
| 4              | 71.0                            | 2.0                 | 69.9                | 3.1                          | .733                             | 8.02                                             | 0.80                                                                    | .906                                                                |
| 5              | 70.7                            | 1.9                 | 69.6                | 3.0                          | .727                             | 7.95                                             | 0.77                                                                    | .909                                                                |
| 6              | 70.3                            | 1.9                 | 69.3                | 3.0                          | .719                             | 7.87                                             | 0.75                                                                    | .910                                                                |
| 7              | 70.4                            | 1.8                 | 69.5                | 2.7                          | .724                             | 7.92                                             | 0.69                                                                    | .916                                                                |
| 8              | 72.3                            | 2.9                 | 70.8                | 4.4                          | .757                             | 8.24                                             | 1.17                                                                    | .871                                                                |
| 9              | 74.2                            | 4.6                 | 71.9                | 6.9                          | .782                             | 8.45                                             | 2.01                                                                    | .806                                                                |
| 10             | 75.6                            | 6.5                 | 72.3                | 9.7                          | .793                             | 8.52                                             | 3.01                                                                    | .738                                                                |
| 11             | 77.1                            | 7.8                 | 73.2                | 11.8                         | .815                             | 8.67                                             | 3.87                                                                    | .700                                                                |
| Noon.          | 78.0                            | 9.4                 | 73.3                | 14.1                         | .818                             | 8.69                                             | 4.81                                                                    | .644                                                                |
| 1              | 78.4                            | 10.9                | 73.0                | 16.3                         | .810                             | 8.58                                             | 5.69                                                                    | .602                                                                |
| 2              | 79.0                            | 11.4                | 73.3                | 17.0                         | .821                             | 8.67                                             | 6.04                                                                    | .591                                                                |
| 3              | 79.0                            | 11.6                | 73.2                | 17.4                         | .817                             | 8.63                                             | 6.20                                                                    | .584                                                                |
| 4              | 78.8                            | 11.4                | 73.1                | 17.2                         | .814                             | 8.60                                             | 6.07                                                                    | .589                                                                |
| 5              | 78.1                            | 10.0                | 73.1                | 15.0                         | .814                             | 8.64                                             | 5.16                                                                    | .629                                                                |
| 6              | 77.5                            | 7.2                 | 73.9                | 10.8                         | .834                             | 8.91                                             | 3.62                                                                    | .714                                                                |
| 7              | 76.1                            | 5.9                 | 73.2                | 8.9                          | .812                             | 8.72                                             | 2.84                                                                    | .757                                                                |
| 8              | 75.3                            | 4.9                 | 72.9                | 7.4                          | .804                             | 8.67                                             | 2.28                                                                    | .792                                                                |
| 9              | 74.5                            | 4.0                 | 72.5                | 6.0                          | .795                             | 8.60                                             | 1.78                                                                    | .832                                                                |
| 10             | 73.7                            | 3.4                 | 72.0                | 5.1                          | .782                             | 8.48                                             | 1.47                                                                    | .852                                                                |
| 11             | 73.0                            | 3.0                 | 71.5                | 4.6                          | .769                             | 8.36                                             | 1.29                                                                    | .865                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                                                 |
|-------|-----------------------|-------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inc.  |                                   |                                                                                                                                            |
| 1     | 135.0                 | ..    | S. or N. W. or N.<br>or S. W.     | Cloudless.                                                                                                                                 |
| 2     | 136.4                 | ..    | S. W. or S.                       | Cloudless nearly the whole day.                                                                                                            |
| 3     | 139.0                 | ..    | S. or S. W.                       | Cloudless.                                                                                                                                 |
| 4     | 143.0                 | ..    | S.                                | Cloudless nearly the whole day.                                                                                                            |
| 5     | Sunday.               |       |                                   | Sunday.                                                                                                                                    |
| 6     | 141.0                 | ..    | S. or W. S. W.                    | Cloudless nearly the whole day.                                                                                                            |
| 7     | 138.0                 | ..    | S. or W.                          | Cloudless nearly the whole day.                                                                                                            |
| 8     | 137.2                 | ..    | S. or N. W. or W.                 | Cloudless the whole day.                                                                                                                   |
| 9     | 135.0                 | ..    | S.                                | Cloudless till 4 A. M. scattered ~i afterwards.                                                                                            |
| 10    | 128.0                 | 0.13  | N. or N. W.                       | Overcast with little rain till 3 A. M. nearly cloudless afterwards.                                                                        |
| 11    | 132.0                 | ..    | N. or S. W.                       | Cloudless.                                                                                                                                 |
| 12    | Sunday.               |       |                                   | Sunday.                                                                                                                                    |
| 13    | 140.7                 | ..    | S. or S. W. or N. W.              | Cloudless.                                                                                                                                 |
| 14    | 145.9                 | ..    | S. or S. W. or W.                 | Cloudless.                                                                                                                                 |
| 15    | 141.5                 | ..    | S. or W. or N. W.                 | Cloudless.                                                                                                                                 |
| 16    | 137.0                 | ..    | S. or W. or N. E.                 | Cloudless nearly the whole day.                                                                                                            |
| 17    | 129.9                 | ..    | S.                                | Cloudy.                                                                                                                                    |
| 18    | 129.7                 | ..    | S. E. or E. or S.                 | Cloudy.                                                                                                                                    |
| 19    | Sunday                |       |                                   | Sunday.                                                                                                                                    |
| 20    | 134.0                 | ..    | S. E. or S.                       | Cloudy with lightning at 9 P. M.                                                                                                           |
| 21    | 134.0                 | ..    | S. or S. E. or W.                 | Cloudy till 6 P. M. cloudless afterwards.                                                                                                  |
| 22    | 139.0                 | ..    | S. or S. W.                       | Cloudless till 3 A. M. scattered ~i or ~i till 9 A. M. cloudless till 6 P. M. overcast afterwards with lightning at 10 P. M.               |
| 23    | 136.9                 | 0.14  | S.                                | Cloudy with lightning at 8 P. M.                                                                                                           |
| 24    | 143.0                 | ..    | S.                                | Cloudless nearly the whole day.                                                                                                            |
| 25    | 144.0                 | ..    | S.                                | Cloudless till 5 P. M. cloudy afterwards and drizzling at 10 P. M.                                                                         |
| 26    | Sunday.               |       |                                   | Sunday.                                                                                                                                    |
| 27    | 144.0                 | ..    | S.                                | Cloudy till 7 A. M. cloudless till 3 P. M. scattered clouds afterwards.                                                                    |
| 28    | 134.0                 | ..    | S.                                | Cloudless till 5 A. M. scattered ~i till 2 P. M. cloudy afterwards, lightning at 6 P. M. and drizzling at 10 P. M.                         |
| 29    | 133.0                 | ..    | S. or S. W.                       | Cloudy with little drizzling till 5 A. M. cloudless till 9 A. M. scattered ~i till 4 P. M. cloudy with drizzling and lightning afterwards. |
| 30    | 134.5                 | 0.22  | N. E. or S.                       | Cloudy.                                                                                                                                    |
| 31    | 140.0                 | 0.79  | N. E. or E. or S. E.              | Cloudy.                                                                                                                                    |

~i Cirri, ~i cumuli, —i strati, ~i cirro-cumuli, ~i cirro-strati, ~i cumulo-strati, ~i nimbi.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                       |
| 1     | 29.319     | 97.0         | 97.7    | 67.0      | ..                   | ..       | S. E.                  | Clear                 |
| 2     | 29.367     | 97.5         | 98.0    | 68.0      | ..                   | ..       | S. W.                  | Ditto                 |
| 3     | 29.409     | 97.0         | 98.2    | 70.0      | ..                   | ..       | E.                     | Ditto                 |
| 4     | 29.363     | 95.0         | 96.3    | 72.2      | ..                   | ..       | W.                     | Ditto                 |
| 5     | 29.347     | 90.1         | 91.2    | 72.9      | ..                   | ..       | E.                     | Ditto                 |
| 6     | 29.335     | 91.5         | 91.8    | 73.0      | ..                   | ..       | E.                     | ✓ scattered in zenith |
| 7     | 29.353     | 91.5         | 91.9    | 74.0      | ..                   | ..       | N.                     | Clear                 |
| 8     | 29.401     | 89.8         | 90.4    | 75.0      | ..                   | ..       | E.                     | ✓ scattered           |
| 9     | 29.411     | 85.5         | 86.1    | 70.2      | ..                   | ..       | N. W.                  | ✓ scattered           |
| 10    | 29.417     | 85.2         | 85.9    | 67.0      | ..                   | ..       | N. W.                  | Clear                 |
| 11    | 29.447     | 89.5         | 90.5    | 68.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 12    | 29.439     | 93.0         | 94.5    | 70.1      | ..                   | ..       | N. W.                  | Ditto                 |
| 13    | 29.417     | 95.0         | 94.6    | 71.0      | ..                   | ..       | N. W.                  | ✓ all over            |
| 14    | 29.407     | 96.0         | 95.2    | 70.6      | ..                   | ..       | N.                     | ✓ scattered           |
| 15    | 29.389     | 97.5         | 98.0    | 72.3      | ..                   | ..       | N.                     | Hazy                  |
| 16    | 29.415     | 92.0         | 93.5    | 72.1      | ..                   | ..       | N.                     | ✓ scatd. towards S.   |
| 17    | 29.447     | 92.3         | 92.3    | 71.4      | ..                   | ..       | N. W.                  | Hazy                  |
| 18    | 29.477     | 90.5         | 92.0    | 71.0      | ..                   | ..       | N. E.                  | Clear                 |
| 19    | 29.399     | 96.0         | 97.0    | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 20    | 29.385     | 95.0         | 96.3    | 67.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 21    | 29.385     | 96.5         | 97.3    | 69.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 22    | 29.287     | 101.5        | 102.9   | 74.5      | ..                   | ..       | N. W.                  | Ditto                 |
| 23    | 29.220     | 101.2        | 102.7   | 71.7      | ..                   | ..       | N. W.                  | Ditto                 |
| 24    | 29.193     | 102.0        | 102.6   | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 25    | 29.155     | 104.0        | 104.5   | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 26    | 29.091     | 106.1        | 106.4   | 72.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 27    | 29.063     | 104.5        | 104.9   | 72.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 28    | 29.061     | 104.2        | 104.8   | 70.6      | ..                   | ..       | W.                     | Ditto                 |
| 29    | 29.061     | 104.0        | 105.4   | 69.9      | ..                   | ..       | N. W.                  | Ditto                 |
| 30    | 29.103     | 100.5        | 100.5   | 74.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 31    | 29.167     | 104.2        | 104.3   | 72.9      | ..                   | ..       | N. W.                  | Ditto                 |
| Mean. | 29.313     | 96.3         | 97.0    | 70.9      | ..                   | ..       |                        | ..                    |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6, at times it is far greater.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.             |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                                |
| 1     | 29.313     | 99.3         | 99.0    | 69.0      | ..                   | ..       | S.                     | Clear                          |
| 2     | 29.349     | 100.4        | 100.0   | 68.0      | ..                   | ..       | N.                     | Ditto                          |
| 3     | 29.389     | 100.0        | 99.7    | 72.5      | ..                   | ..       | E.                     | Ditto                          |
| 4     | 29.347     | 99.9         | 99.9    | 73.3      | ..                   | ..       | W.                     | Ditto                          |
| 5     | 29.339     | 95.0         | 95.0    | 75.0      | ..                   | ..       | W.                     | Hazy                           |
| 6     | 29.315     | 95.0         | 95.8    | 73.0      | ..                   | ..       | E.                     | ~ scattered                    |
| 7     | 29.325     | 95.5         | 96.2    | 75.0      | ..                   | ..       | N.                     | Clear                          |
| 8     | 29.357     | 94.0         | 94.1    | 76.2      | ..                   | ..       | N. W.                  | Hazy                           |
| 9     | 29.331     | 90.0         | 90.6    | 71.4      | ..                   | ..       | N. W.                  | Clear                          |
| 10    | 29.405     | 91.0         | 92.3    | 69.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 11    | 29.425     | 96.5         | 96.7    | 70.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 12    | 29.423     | 97.0         | 98.3    | 71.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 13    | 29.381     | 97.0         | 97.4    | 70.5      | ..                   | ..       | N. W.                  | ~ all over                     |
| 14    | 29.385     | 97.9         | 96.7    | 71.2      | ..                   | ..       | N. E.                  | ~ scattered                    |
| 15    | 29.375     | 100.5        | 100.2   | 75.5      | ..                   | ..       | N. E.                  | Hazy                           |
| 16    | 29.389     | 97.3         | 93.9    | 71.0      | ..                   | ..       | N. W.                  | ~ very few scattered in zenith |
| 17    | 29.403     | 94.0         | 93.5    | 74.4      | ..                   | ..       | N. W.                  | ~ all over                     |
| 18    | 29.449     | 94.5         | 95.3    | 72.5      | ..                   | ..       | N. W.                  | Clear                          |
| 19    | 29.381     | 100.5        | 101.6   | 71.5      | ..                   | ..       | N. W.                  | Ditto                          |
| 20    | 29.375     | 97.9         | 98.3    | 67.2      | ..                   | ..       | N. W.                  | Ditto                          |
| 21    | 29.375     | 98.3         | 99.1    | 70.2      | ..                   | ..       | N. W.                  | Ditto                          |
| 22    | 29.263     | 106.7        | 107.5   | 73.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 23    | 29.205     | 106.5        | 107.2   | 72.8      | ..                   | ..       | N. W.                  | Ditto                          |
| 24    | 29.151     | 106.2        | 106.9   | 71.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 25    | 29.133     | 108.1        | 109.5   | 70.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 26    | 29.073     | 109.0        | 110.8   | 74.5      | ..                   | ..       | N. W.                  | Ditto                          |
| 27    | 29.053     | 109.6        | 111.0   | 72.5      | ..                   | ..       | N. W.                  | Ditto                          |
| 28    | 29.055     | 108.9        | 109.2   | 72.0      | ..                   | ..       | W.                     | Ditto                          |
| 29    | 29.057     | 109.5        | 109.5   | 74.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 30    | 29.099     | 105.5        | 106.8   | 75.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 31    | 29.167     | 107.8        | 108.3   | 74.0      | ..                   | ..       | N. W.                  | Ditto                          |
| Mean. | 29.293     | 97.0         | 100.8   | 72.1      | ..                   | ..       | ..                     | ..                             |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.*

Minimum pressure observed at 4 p. m.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |        | Aspect of the Sky.             | Rain Gauge.                  |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|--------|--------------------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean.  |                                | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.257     | 102.7        | 103.0   | 70.0      | 102.0                | 79.0     | 90.5   | Clear                          | ..                           | N.W.                   |
| 2     | 29.285     | 104.5        | 99.5    | 71.0      | 103.5                | 82.5     | 93.0   | Ditto                          | ..                           | N.W.                   |
| 3     | 29.297     | 102.8        | 102.5   | 73.0      | 102.0                | 84.0     | 93.0   | Ditto                          | ..                           | N. E.                  |
| 4     | 29.273     | 104.2        | 104.5   | 75.0      | 103.5                | 83.3     | 93.4   | Ditto                          | ..                           | N.W.                   |
| 5     | 29.273     | 98.0         | 98.3    | 76.2      | 97.5                 | 80.5     | 89.0   | ~ scattered in zenith          | ..                           | N. E.                  |
| 6     | 29.221     | 100.6        | 101.4   | 76.0      | 100.2                | 80.5     | 90.35  | Clear                          | ..                           | N.W.                   |
| 7     | 29.229     | 101.0        | 102.0   | 76.6      | 98.0                 | 78.0     | 88.0   | Ditto                          | ..                           | N.W.                   |
| 8     | 29.289     | 98.0         | 96.6    | 73.3      | 96.2                 | 79.2     | 87.7   | ~ scattered                    | ..                           | N.W.                   |
| 9     | 29.307     | 95.0         | 94.5    | 73.0      | 94.0                 | 83.5     | 88.75  | ~ all over                     | ..                           | N.W.                   |
| 10    | 29.345     | 96.1         | 95.9    | 69.6      | 95.0                 | 74.5     | 84.75  | Clear                          | ..                           | N.W.                   |
| 11    | 29.329     | 97.8         | 97.8    | 73.0      | 97.3                 | 77.5     | 87.4   | Ditto                          | ..                           | N.W.                   |
| 12    | 29.319     | 103.5        | 103.9   | 74.6      | 103.0                | 81.7     | 92.35  | Ditto                          | ..                           | N.W.                   |
| 13    | 29.269     | 100.5        | 100.0   | 75.5      | 99.8                 | 84.0     | 91.9   | ~ scattered all over           | ..                           | N.W.                   |
| 14    | 29.277     | 101.0        | 100.6   | 76.0      | 100.0                | 85.0     | 92.5   | ~ scattered                    | ..                           | N. E.                  |
| 15    | 29.307     | 100.3        | 99.5    | 73.7      | 99.0                 | 85.5     | 92.25  | Hazy                           | ..                           | N.                     |
| 16    | 29.293     | 102.7        | 103.0   | 72.5      | 102.2                | 78.7     | 90.45  | ~ very few scattered in zenith | ..                           | N.W.                   |
| 17    | 29.329     | 97.7         | 98.0    | 75.8      | 97.5                 | 84.5     | 91.0   | Clear                          | ..                           | W.                     |
| 18    | 29.381     | 103.0        | 101.5   | 74.5      | 101.0                | 79.0     | 90.0   | Ditto                          | ..                           | N.W.                   |
| 19    | 29.295     | 105.0        | 105.0   | 72.2      | 104.5                | 79.0     | 91.75  | Ditto                          | ..                           | N.W.                   |
| 20    | 29.281     | 105.0        | 104.5   | 72.0      | 104.0                | 84.5     | 94.25  | Ditto                          | ..                           | N.W.                   |
| 21    | 29.213     | 105.0        | 106.0   | 73.0      | 106.0                | 85.0     | 95.7   | Ditto                          | ..                           | N.W.                   |
| 22    | 29.161     | 110.0        | 109.9   | 74.1      | 109.5                | 87.0     | 98.25  | Ditto                          | ..                           | N.W.                   |
| 23    | 29.129     | 110.0        | 109.5   | 73.8      | 109.0                | 89.0     | 99.0   | Ditto                          | ..                           | N.W.                   |
| 24    | 29.107     | 110.5        | 110.0   | 73.0      | 109.0                | 92.4     | 100.7  | Ditto                          | ..                           | W.                     |
| 25    | 29.039     | 111.8        | 113.5   | 74.1      | 111.5                | 96.8     | 103.9  | Ditto                          | ..                           | N.W.                   |
| 26    | 28.997     | 114.5        | 114.0   | 73.5      | 114.0                | 91.5     | 102.5  | Ditto                          | ..                           | N.W.                   |
| 27    | 28.979     | 114.5        | 113.2   | 75.3      | 112.7                | 93.0     | 102.85 | Ditto                          | ..                           | N.                     |
| 28    | 28.997     | 113.8        | 113.5   | 73.2      | 113.0                | 91.2     | 101.1  | Ditto                          | ..                           | W.                     |
| 29    | 28.995     | 114.0        | 113.5   | 73.0      | 112.7                | 90.5     | 101.6  | Ditto                          | ..                           | N.W.                   |
| 30    | 29.025     | 112.5        | 112.5   | 75.0      | 111.5                | 90.0     | 100.75 | Ditto                          | ..                           | N.W.                   |
| 31    | 29.085     | 112.4        | 112.4   | 75.0      | 111.5                | 95.8     | 103.65 | Ditto                          | ..                           | N.W.                   |
| Mn.   | 29.210     | 104.7        | 104.5   | 73.7      | 103.8                | 84.7     | 94.31  | ..                             | ..                           | ..                     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 320 Faint. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|--------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                  | Max.                                      | Min.    | Diff.   |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                          | Inches.                                   | Inches. | Inches. | o                             | o                                                | o    | o     |
| 1     | 29.878                                           | 29.961                                    | 29.797  | 0.164   | 79.5                          | 90.2                                             | 70.4 | 19.8  |
| 2     | <i>Sunday.</i>                                   |                                           |         |         |                               |                                                  |      |       |
| 3     | .796                                             | .873                                      | .692    | .181    | 81.6                          | 90.1                                             | 71.6 | 18.5  |
| 4     | .761                                             | .822                                      | .687    | .135    | 78.9                          | 88.2                                             | 70.7 | 17.5  |
| 5     | .751                                             | .824                                      | .683    | .141    | 81.0                          | 88.1                                             | 72 0 | 16.1  |
| 6     | .640                                             | .720                                      | .545    | .175    | 85.3                          | 95.9                                             | 77.5 | 18.4  |
| 7     | .621                                             | .689                                      | .554    | .135    | 85.6                          | 97.3                                             | 77.8 | 19.5  |
| 8     | .610                                             | .673                                      | .554    | .119    | 85.5                          | 94.6                                             | 79.9 | 14.7  |
| 9     | <i>Sunday.</i>                                   |                                           |         |         |                               |                                                  |      |       |
| 10    | .627                                             | .700                                      | .557    | .143    | 85.6                          | 94 4                                             | 80.2 | 14.2  |
| 11    | .675                                             | .756                                      | .597    | .159    | 85.7                          | 94.8                                             | 78.8 | 16.0  |
| 12    | .724                                             | .813                                      | .633    | .180    | 85.5                          | 93.7                                             | 79.6 | 14.1  |
| 13    | .664                                             | .758                                      | .573    | .185    | 84.3                          | 92.2                                             | 75.6 | 16.6  |
| 14    | <i>Good<br/>Friday.</i>                          |                                           |         |         |                               |                                                  |      |       |
| 15    | .731.                                            | .795                                      | .684    | .111    | 73.1                          | 77.8                                             | 69.6 | 8.2   |
| 16    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                                  |      |       |
| 17    | .711                                             | .766                                      | .630    | .136    | 76.2                          | 82.4                                             | 72.0 | 10.4  |
| 18    | .767                                             | .823                                      | .717    | .106    | 80.2                          | 90.2                                             | 70.6 | 19.6  |
| 19    | .799                                             | .879                                      | .732    | .147    | 83.5                          | 92.0                                             | 77.0 | 15.0  |
| 20    | .765                                             | .852                                      | .668    | .184    | 83.2                          | 90.2                                             | 77.4 | 12.8  |
| 21    | .698                                             | .766                                      | .608    | .158    | 83.4                          | 91.2                                             | 77.8 | 13.4  |
| 22    | .659                                             | .736                                      | .510    | .226    | 81.8                          | 90.8                                             | 76 5 | 14.3  |
| 23    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                                  |      |       |
| 24    | .642                                             | .717                                      | .568    | .149    | 84.2                          | 92.4                                             | 76.5 | 15.9  |
| 25    | .743                                             | .822                                      | .688    | .134    | 83.2                          | 91.0                                             | 77.9 | 13 1  |
| 26    | .779                                             | .856                                      | .697    | .159    | 85.4                          | 93.4                                             | 79.3 | 14.1  |
| 27    | .731                                             | .806                                      | .633    | .173    | 86.5                          | 93.6                                             | 81.0 | 12.6  |
| 28    | .637                                             | .710                                      | .551    | .159    | 86.7                          | 94.8                                             | 81.6 | 13.2  |
| 29    | .655                                             | .725                                      | .582    | .143    | 86.6                          | 93.8                                             | 81.0 | 12.8  |
| 30    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                                  |      |       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1     | °<br>74.1                       | °<br>5.4            | °<br>71.4           | °<br>8.1                     | Inches.<br>0.761                 | T. gr.<br>8.22                                   | T. gr.<br>2.44                                                          | 0.771                                                               |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 3     | 77.2                            | 4.4                 | 75.0                | 6.6                          | 0.854                            | 9.18                                             | 2.16                                                                    | .810                                                                |
| 4     | 74.9                            | 4.0                 | 72.9                | 6.0                          | 0.797                            | 8.63                                             | 1.84                                                                    | .824                                                                |
| 5     | 77.6                            | 3.4                 | 75.9                | 5.1                          | 0.879                            | 9.47                                             | 1.67                                                                    | .850                                                                |
| 6     | 81.1                            | 4.2                 | 79.0                | 6.3                          | 0.970                            | 10.37                                            | 2.27                                                                    | .820                                                                |
| 7     | 81.7                            | 3.9                 | 79.7                | 5.9                          | 0.992                            | 10.59                                            | 2.17                                                                    | .830                                                                |
| 8     | 81.6                            | 3.9                 | 79.6                | 5.9                          | 0.989                            | 10.56                                            | 2.16                                                                    | .830                                                                |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 10    | 81.5                            | 4.1                 | 79.4                | 6.2                          | 0.983                            | 10.49                                            | 2.27                                                                    | .822                                                                |
| 11    | 77.6                            | 8.1                 | 73.5                | 12.2                         | 0.814                            | 8.69                                             | 4.11                                                                    | .679                                                                |
| 12    | 80.6                            | 4.9                 | 78.1                | 7.4                          | 0.943                            | 10.08                                            | 2.64                                                                    | .792                                                                |
| 13    | 79.7                            | 4.6                 | 77.4                | 6.9                          | 0.922                            | 9.87                                             | 2.41                                                                    | .804                                                                |
| 14    | <i>Good</i>                     |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 15    | <i>Friday.</i><br>71.5          | 1.6                 | 70.7                | 2.4                          | 0.744                            | 8.15                                             | 0.64                                                                    | .927                                                                |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 17    | 73.9                            | 2.3                 | 72.7                | 3.5                          | 0.792                            | 8.61                                             | 1.05                                                                    | .891                                                                |
| 18    | 76.9                            | 3.3                 | 75.2                | 5.0                          | 0.860                            | 9.28                                             | 1.60                                                                    | .853                                                                |
| 19    | 79.3                            | 4.2                 | 77.2                | 6.3                          | 0.916                            | 9.83                                             | 2.17                                                                    | .819                                                                |
| 20    | 79.1                            | 4.1                 | 77.0                | 6.2                          | 0.910                            | 9.77                                             | 2.12                                                                    | .822                                                                |
| 21    | 78.5                            | 4.9                 | 76.0                | 7.4                          | 0.882                            | 9.47                                             | 2.49                                                                    | .792                                                                |
| 22    | 76.0                            | 5.8                 | 73.1                | 8.7                          | 0.803                            | 8.63                                             | 2.77                                                                    | .757                                                                |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 24    | 79.6                            | 4.6                 | 77.3                | 6.9                          | 0.919                            | 9.84                                             | 2.40                                                                    | .804                                                                |
| 25    | 79.1                            | 4.1                 | 77.0                | 6.2                          | 0.910                            | 9.77                                             | 2.12                                                                    | .822                                                                |
| 26    | 81.0                            | 4.4                 | 78.8                | 6.6                          | 0.964                            | 10.29                                            | 2.39                                                                    | .812                                                                |
| 27    | 82.4                            | 4.1                 | 80.3                | 6.2                          | 1.011                            | 10.78                                            | 2.32                                                                    | .823                                                                |
| 28    | 82.5                            | 4.2                 | 80.4                | 6.3                          | 1.014                            | 10.81                                            | 2.37                                                                    | .820                                                                |
| 29    | 81.7                            | 4.9                 | 79.2                | 7.4                          | 0.976                            | 10.41                                            | 2.73                                                                    | .792                                                                |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Faht. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.723                                    | 29.882                                                 | 29.597  | 0.285   | 78.7                       | 82.8                                                     | 71.4 | 11.4  |
| 1          | .710                                      | .866                                                   | .598    | .268    | 78.4                       | 82.6                                                     | 70.7 | 11.9  |
| 2          | .698                                      | .862                                                   | .579    | .283    | 78.0                       | 82.2                                                     | 71.8 | 10.4  |
| 3          | .689                                      | .862                                                   | .567    | .295    | 77.8                       | 82.0                                                     | 72.0 | 10.0  |
| 4          | .696                                      | .875                                                   | .562    | .313    | 77.7                       | 82.2                                                     | 71.4 | 10.8  |
| 5          | .699                                      | .891                                                   | .585    | .306    | 77.5                       | 82.0                                                     | 70.5 | 11.5  |
| 6          | .718                                      | .901                                                   | .601    | .300    | 77.5                       | 81.7                                                     | 70.4 | 11.3  |
| 7          | .745                                      | .924                                                   | .637    | .287    | 78.3                       | 82.8                                                     | 71.8 | 11.0  |
| 8          | .766                                      | .954                                                   | .663    | .291    | 80.7                       | 85.2                                                     | 72.3 | 12.9  |
| 9          | .776                                      | .961                                                   | .671    | .290    | 83.2                       | 88.0                                                     | 74.2 | 13.8  |
| 10         | .775                                      | .961                                                   | .666    | .295    | 85.4                       | 90.2                                                     | 74.0 | 16.2  |
| 11         | .769                                      | .944                                                   | .669    | .275    | 87.1                       | 91.4                                                     | 72.2 | 19.2  |
| Noon.      | .743                                      | .920                                                   | .651    | .269    | 88.8                       | 93.0                                                     | 72.5 | 20.5  |
| 1          | .718                                      | .892                                                   | .618    | .274    | 89.9                       | 94.4                                                     | 73.3 | 21.1  |
| 2          | .688                                      | .849                                                   | .595    | .254    | 90.5                       | 96.0                                                     | 70.0 | 26.0  |
| 3          | .663                                      | .820                                                   | .562    | .258    | 90.8                       | 97.0                                                     | 71.2 | 25.8  |
| 4          | .643                                      | .797                                                   | .545    | .252    | 90.4                       | 97.3                                                     | 72.0 | 25.3  |
| 5          | .642                                      | .803                                                   | .549    | .254    | 89.1                       | 95.0                                                     | 72.0 | 23.0  |
| 6          | .660                                      | .817                                                   | .556    | .261    | 86.1                       | 91.3                                                     | 71.4 | 19.9  |
| 7          | .672                                      | .831                                                   | .510    | .321    | 83.6                       | 87.2                                                     | 70.7 | 16.5  |
| 8          | .694                                      | .837                                                   | .600    | .237    | 81.8                       | 85.8                                                     | 69.8 | 16.0  |
| 9          | .720                                      | .870                                                   | .612    | .258    | 80.9                       | 85.2                                                     | 69.8 | 15.4  |
| 10         | .731                                      | .876                                                   | .622    | .254    | 80.3                       | 84.6                                                     | 69.6 | 15.0  |
| 11         | .730                                      | .871                                                   | .608    | .263    | 79.4                       | 84.2                                                     | 69.7 | 14.5  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|------------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|            | o                          | o                   | o                   | o                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| Mid-night. | 76.5                       | 2.2                 | 75.4                | 3.3                       | 0.865                         | 9.37                                          | 1.04                                                          | 0.900                                                     |
| 1          |                            | 76.4                | 2.0                 | 75.4                      | 3.0                           | .865                                          | .37                                                           | .909                                                      |
| 2          | 76.2                       | 1.8                 | 75.3                | 2.7                       | .862                          | .34                                           | .85                                                           | .917                                                      |
| 3          | 76.2                       | 1.6                 | 75.4                | 2.4                       | .865                          | .39                                           | .74                                                           | .927                                                      |
| 4          | 76.2                       | 1.5                 | 75.4                | 2.3                       | .865                          | .39                                           | .71                                                           | .930                                                      |
| 5          | 76.1                       | 1.4                 | 75.4                | 2.1                       | .865                          | .39                                           | .65                                                           | .935                                                      |
| 6          | 76.2                       | 1.3                 | 75.5                | 2.0                       | .868                          | .42                                           | .62                                                           | .938                                                      |
| 7          | 76.9                       | 1.4                 | 76.2                | 2.1                       | .887                          | .62                                           | .66                                                           | .936                                                      |
| 8          | 78.4                       | 2.3                 | 77.2                | 3.5                       | .916                          | .87                                           | 1.17                                                          | .894                                                      |
| 9          | 75.9                       | 3.7                 | 77.6                | 5.6                       | .928                          | .95                                           | .94                                                           | .837                                                      |
| 10         | 80.4                       | 5.0                 | 77.9                | 7.5                       | .937                          | 10.00                                         | 2.68                                                          | .789                                                      |
| 11         | 81.2                       | 5.9                 | 78.2                | 8.9                       | .946                          | .07                                           | 3.26                                                          | .755                                                      |
|            |                            |                     |                     |                           |                               |                                               |                                                               |                                                           |
| Noon.      | 81.8                       | 7.0                 | 78.3                | 10.5                      | .949                          | .05                                           | 3.95                                                          | .718                                                      |
| 1          | 82.1                       | 7.8                 | 78.2                | 11.7                      | .946                          | .00                                           | 4.46                                                          | .692                                                      |
| 2          | 82.1                       | 8.4                 | 77.9                | 12.6                      | .937                          | 9.90                                          | 4.82                                                          | .673                                                      |
| 3          | 82.1                       | 8.7                 | 77.7                | 13.1                      | .931                          | .84                                           | 5.00                                                          | .663                                                      |
| 4          | 81.8                       | 8.6                 | 77.5                | 12.9                      | .925                          | .78                                           | 4.89                                                          | .667                                                      |
| 5          | 81.6                       | 7.5                 | 77.8                | 11.3                      | .934                          | .91                                           | 4.21                                                          | .702                                                      |
| 6          | 79.7                       | 6.4                 | 76.5                | 9.6                       | .896                          | .56                                           | 3.39                                                          | .738                                                      |
| 7          | 78.8                       | 4.8                 | 76.4                | 7.2                       | .893                          | .58                                           | 2.45                                                          | .796                                                      |
| 8          | 77.7                       | 4.1                 | 75.6                | 6.2                       | .871                          | .37                                           | 2.03                                                          | .822                                                      |
| 9          | 77.4                       | 3.5                 | 75.6                | 5.3                       | .871                          | .39                                           | 1.71                                                          | .846                                                      |
| 10         | 77.2                       | 3.1                 | 75.6                | 4.7                       | .871                          | .39                                           | 1.52                                                          | .861                                                      |
| 11         | 76.8                       | 2.6                 | 75.5                | 3.9                       | .868                          | .38                                           | 1.24                                                          | .883                                                      |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Solar radiation, Weather, &c.

| Date. | Max Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                              |
|-------|----------------------|-------|-----------------------------------|---------------------------------------------------------------------------------------------------------|
|       | o                    | Inc.  |                                   |                                                                                                         |
| 1     | 144.0                | ..    | S. E. or E. or N. W.              | Cloudless                                                                                               |
| 2     | <i>Sunday.</i>       |       |                                   |                                                                                                         |
| 3     | 129.6                | ..    | S. or S. E.                       | Cloudless till 8 A. M. scattered ☉ till 4 P. M. cloudless till 9 P. M. overcast and raining afterwards. |
| 4     | 126.0                | 0.94  | S. E. or S.                       | Cloudy till 3 A. M. cloudless till 11 A. M. cloudy afterwards, with drizzling between 6 and 7 P. M.     |
| 5     | 130.4                | 0.18  | S. or S. E.                       | Cloudless till 5 A. M. cloudy till 8 P. M. cloudless afterwards.                                        |
| 6     | 142.0                | ..    | S. or S. E.                       | Cloudless.                                                                                              |
| 7     | 145.0                | ..    | S. E. or S. W.                    | Nearly cloudless the whole day.                                                                         |
| 8     | 144.2                | ..    | S. W. or S. or E.                 | Scattered ☉ or cloudless.                                                                               |
| 9     | <i>Sunday.</i>       |       |                                   |                                                                                                         |
| 10    | 130.0                | ..    | S. E. or S.                       | Cloudy till 6 P. M. cloudless afterwards.                                                               |
| 11    | 139.5                | ..    | S.                                | Cloudless till 7 A. M. scattered ☾ or ☾ till 6 P. M. cloudless till 9 P. M. scattered ☾ afterwards.     |
| 12    | 143.0                | ..    | S.                                | Nearly cloudy the whole day.                                                                            |
| 13    | 127.0                | ..    | S.                                | Nearly cloudy the whole day.                                                                            |
| 14    | <i>Good Friday.</i>  |       | ..                                |                                                                                                         |
| 15    | ..                   | 4.13  | S. or S. E.                       | Overcast, and also raining from 9 A. M. to 2 P. M.                                                      |
| 16    | <i>Sunday</i>        | 1.44  |                                   |                                                                                                         |
| 17    | ..                   | ..    | S. or E.                          | Nearly cloudy the whole day.                                                                            |
| 18    | 145.0                | 0.56  | N. E. or E. or S.                 | Overcast and raining till 5 A. M. cloudless till 11 A. M. cloudy till 5 P. M. cloudless afterwards.     |
| 19    | 149.5                | ..    | Calm or S. or S. E.               | Cloudless till 7 A. M. scattered ☾ or ☾ or ☾ till 7 P. M. cloudless afterwards.                         |
| 20    | 136.2                | ..    | S. or S. E.                       | Cloudy till 3 A. M. cloudless till 7 A. M. scattered ☉ or ☾ till 4 P. M. cloudless afterwards.          |
| 21    | 130.5                | ..    | S. E. or S.                       | Scattered ☉ till 11 A. M. cloudless till 3 P. M. scattered ☾ till 7 P. M. cloudless afterwards.         |
| 22    | 126.0                | ..    | S. or S. E.                       | Cloudless till 6 A. M. cloudy afterwards.                                                               |
| 23    | <i>Sunday.</i>       |       |                                   |                                                                                                         |
| 24    | 141.0                | ..    | S. E. or W. or N. E.              | Cloudless till 7 A. M. scattered ☉ till 4 P. M. cloudless afterwards.                                   |
| 25    | 126.0                | ..    | S. or N. E. or E.                 | Cloudless till 6 A. M. scattered ☉ or ☾ till 7 P. M. cloudless afterwards.                              |
| 26    | 136.4                | ..    | Calm or S.                        | Cloudless till 6 A. M. scattered ☉ or ☾ till 6 P. M. cloudless afterwards.                              |
| 27    | 137.0                | ..    | S. or S. E.                       | Scattered clouds of various kinds.                                                                      |
| 28    | 142.0                | ..    | S.                                | Cloudless. [cloudy afterwards.                                                                          |
| 29    | 145.0                | ..    | S.                                | Cloudless till 3 A. M. scattered ☾ or ☾                                                                 |
| 30    | <i>Sunday.</i>       |       |                                   |                                                                                                         |

☾ Cirri, ☾ cirro-strati, ☉ cumuli, ☉ cumulo-strati, ☾ nimbi,—i strati, ☾ i cirro-cumuli.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of June, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                       |
| 1     | 29.135     | 106.9        | 106.9   | 69.5      | ..                   | ..       | N. W.                  | Clear                 |
| 2     | 29.135     | 102.5        | 102.8   | 76.3      | ..                   | ..       | N. W.                  | Ditto                 |
| 3     | 29.157     | 102.7        | 103.7   | 75.6      | ..                   | ..       | N.                     | Ditto                 |
| 4     | 29.157     | 102.9        | 103.8   | 76.0      | ..                   | ..       | W.                     | Ditto                 |
| 5     | 29.155     | 103.0        | 103.5   | 77.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 6     | 29.135     | 103.8        | 104.9   | 75.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 7     | 29.093     | 104.5        | 104.9   | 75.6      | ..                   | ..       | N. W.                  | Ditto                 |
| 8     | 29.131     | 103.5        | 103.3   | 78.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 9     | 29.167     | 99.8         | 100.3   | 81.0      | ..                   | ..       | W.                     | ~ scattered in zenith |
| 10    | 29.185     | 97.2         | 98.2    | 79.5      | ..                   | ..       | N. W.                  | Clear                 |
| 11    | 29.131     | 99.9         | 100.8   | 80.0      | ..                   | ..       | W.                     | ~ scattered           |
| 12    | 29.069     | 102.0        | 102.2   | 80.9      | ..                   | ..       | N. W.                  | Clear                 |
| 13    | 29.025     | 98.8         | 98.8    | 82.0      | ..                   | ..       | S. W.                  | Hazy                  |
| 14    | 29.113     | 86.7         | 86.0    | 80.1      | ..                   | ..       | S. E.                  | ~ all over            |
| 15    | 29.155     | 88.5         | 89.1    | 79.4      | ..                   | ..       | N. W.                  | ~ Ditto               |
| 16    | 29.137     | 96.5         | 97.5    | 80.4      | ..                   | ..       | W.                     | Clear                 |
| 17    | 29.111     | 97.8         | 98.0    | 80.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 18    | 29.143     | 93.0         | 93.9    | 80.0      | ..                   | ..       | E.                     | ~ scattered           |
| 19    | 29.149     | 90.0         | 88.9    | 80.0      | ..                   | ..       | E.                     | ~ all over            |
| 20    | 29.155     | 91.5         | 92.0    | 81.0      | ..                   | ..       | S. E.                  | ~ Ditto               |
| 21    | 29.147     | 92.5         | 93.2    | 80.2      | ..                   | ..       | S. E.                  | ~ in zenith ~ Hazy    |
| 22    | 29.097     | 92.2         | 93.3    | 81.0      | ..                   | ..       | W.                     | ~ all over            |
| 23    | 29.075     | 90.1         | 91.2    | 83.3      | ..                   | ..       | W.                     | ~ Ditto               |
| 24    | 29.055     | 85.0         | 84.0    | 81.0      | ..                   | ..       | E.                     | ~ Ditto               |
| 25    | 29.205     | 85.0         | 84.0    | 81.5      | ..                   | ..       | ..                     | ~ Ditto               |
| 26    | 29.211     | 85.0         | 85.5    | 81.0      | ..                   | ..       | S. E.                  | ~ Ditto               |
| 27    | 29.267     | 90.0         | 90.5    | 80.0      | ..                   | ..       | S. E.                  | ~ scattered           |
| 28    | 29.197     | 88.2         | 87.7    | 83.0      | ..                   | ..       | S. E.                  | ~ all over            |
| 29    | 29.125     | 86.0         | 86.6    | 82.0      | ..                   | ..       | E.                     | ~ Ditto               |
| 30    | 29.123     | 85.8         | 86.4    | 82.4      | ..                   | ..       | N. E.                  | ~ scattered all over  |
| Mean. | 29.38      | 95.0         | 95.396  | 79.436    | ..                   | ..       |                        | ..                    |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6, at times it is far greater.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of June, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.121     | 110.0        | 110.0   | 69.5      | ..                   | ..       | N. W.                  | Clear                |
| 2     | 29.109     | 107.2        | 107.5   | 77.2      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.141     | 105.5        | 105.5   | 77.3      | ..                   | ..       | N. W.                  | Ditto                |
| 4     | 29.139     | 105.8        | 106.4   | 77.6      | ..                   | ..       | W.                     | Ditto                |
| 5     | 29.125     | 106.6        | 107.2   | 77.5      | ..                   | ..       | N. W.                  | Ditto                |
| 6     | 29.117     | 108.2        | 109.4   | 76.0      | ..                   | ..       | N. W.                  | Ditto                |
| 7     | 29.077     | 108.9        | 108.7   | 76.0      | ..                   | ..       | N. W.                  | Ditto                |
| 8     | 29.105     | 106.6        | 107.1   | 81.0      | ..                   | ..       | N. W.                  | Ditto                |
| 9     | 29.137     | 104.0        | 105.3   | 81.7      | ..                   | ..       | W.                     | Ditto                |
| 10    | 29.175     | 102.8        | 103.8   | 79.5      | ..                   | ..       | N. W.                  | Ditto                |
| 11    | 29.108     | 107.0        | 108.0   | 80.5      | ..                   | ..       | N. W.                  | ~ to E.              |
| 12    | 29.045     | 104.3        | 104.8   | 80.5      | ..                   | ..       | N. W.                  | Clear                |
| 13    | 29.009     | 101.5        | 101.2   | 82.4      | ..                   | ..       | S. W.                  | Hazy                 |
| 14    | 29.129     | 89.0         | 88.3    | 81.4      | ..                   | ..       | N.                     | ~ all over           |
| 15    | 29.155     | 92.0         | 93.0    | 79.5      | ..                   | ..       | S. W.                  | ~ Ditto              |
| 16    | 29.131     | 99.1         | 99.3    | 80.4      | ..                   | ..       | W.                     | ~ scattered          |
| 17    | 29.089     | 100.9        | 101.6   | 80.4      | ..                   | ..       | W.                     | Clear                |
| 18    | 29.115     | 97.0         | 98.0    | 80.5      | ..                   | ..       | E.                     | ~ scattered          |
| 19    | 29.105     | 93.9         | 94.0    | 79.0      | ..                   | ..       | W.                     | ~ all over           |
| 20    | 29.141     | 93.8         | 94.5    | 81.8      | ..                   | ..       | N. W.                  | ~ scattered          |
| 21    | 29.141     | 65.7         | 96.2    | 81.5      | ..                   | ..       | W.                     | ~ no zenith          |
| 22    | 29.097     | 96.6         | 97.3    | 83.2      | ..                   | ..       | S. W.                  | ~ all over           |
| 23    | 29.069     | 95.2         | 95.7    | 81.5      | ..                   | ..       | W.                     | ~ Ditto              |
| 24    | 29.147     | 85.9         | 83.3    | 81.0      | ..                   | ..       | E.                     | ~ raining            |
| 25    | 29.177     | 86.0         | 85.2    | 81.5      | ..                   | ..       | ..                     | ~ all over           |
| 26    | 29.193     | 87.0         | 87.2    | 81.0      | ..                   | ..       | S. E.                  | ~ scattered all over |
| 27    | 29.141     | 92.0         | 92.5    | 81.8      | ..                   | ..       | S.                     | ~ scattered          |
| 28    | 29.175     | 85.0         | 82.0    | 80.0      | ..                   | ..       | N. E.                  | ~ raining            |
| 29    | 29.117     | 88.8         | 89.5    | 82.8      | ..                   | ..       | E.                     | ~ all over           |
| 30    | 29.085     | 86.9         | 87.3    | 82.0      | ..                   | ..       | N. W.                  | ~ scattered all over |
| Mean. | 29.120     | 98.1         | 98.32   | 79.866    | ..                   | ..       | ..                     |                      |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of June, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |        | Aspect of the Sky. | Rain Gauge.                  |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|--------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean.  |                    | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.059     | 112.6        | 111.8   | 67.9      | 111.0                | 96.8     | 103.9  | Clear              | ..                           | N.W.                   |
| 2     | 29.015     | 106.0        | 105.0   | 76.6      | 105.0                | 92.5     | 98.75  | Ditto              | ..                           | N.                     |
| 3     | 29.065     | 110.0        | 110.0   | 80.0      | 109.2                | 91.0     | 100.1  | Ditto              | ..                           | N.W.                   |
| 4     | 29.057     | 111.5        | 112.2   | 78.7      | 112.0                | 91.6     | 101.8  | Ditto              | ..                           | W.                     |
| 5     | 29.025     | 112.0        | 112.3   | 77.3      | 111.0                | 92.3     | 101.65 | Ditto              | ..                           | N.W.                   |
| 6     | 29.015     | 111.0        | 110.5   | 76.5      | 109.5                | 94.5     | 102.0  | Ditto              | ..                           | N.W.                   |
| 7     | 28.993     | 112.0        | 112.2   | 76.9      | 112.0                | 98.0     | 105.0  | Ditto              | ..                           | N.W.                   |
| 8     | 29.027     | 110.0        | 108.3   | 79.0      | 108.0                | 96.7     | 102.35 | ~ all over         | ..                           | N.W.                   |
| 9     | 29.103     | 103.0        | 98.9    | 80.7      | 100.0                | 90.5     | 95.25  | ~ Ditto            | 0.34                         | N. E.                  |
| 10    | 29.063     | 108.0        | 108.3   | 82.7      | 107.0                | 80.0     | 93.5   | Clear              | ..                           | N.W.                   |
| 11    | 28.993     | 108.0        | 108.6   | 81.3      | 107.5                | 91.5     | 99.5   | ~ to E.            | ..                           | W.                     |
| 12    | 28.947     | 107.8        | 107.5   | 82.2      | 106.5                | 92.0     | 99.25  | Clear              | ..                           | N.W.                   |
| 13    | 28.937     | 103.5        | 95.5    | 81.0      | 98.0                 | 95.0     | 96.5   | Hazy               | ..                           | N.                     |
| 14    | 29.051     | 93.7         | 93.5    | 80.4      | 93.0                 | 80.0     | 86.5   | ~ scattered        | 0.85                         | N.                     |
| 15    | 29.103     | 97.3         | 96.0    | 81.6      | 96.0                 | 86.0     | 91.0   | ~ all over         | ..                           | W.                     |
| 16    | 29.059     | 97.0         | 94.4    | 84.0      | 94.0                 | 86.5     | 90.25  | ~ Ditto            | ..                           | S. W.                  |
| 17    | 29.017     | 104.7        | 105.2   | 81.8      | 104.2                | 89.5     | 96.85  | ~ scattered        | ..                           | N.W.                   |
| 18    | 29.065     | 100.0        | 101.0   | 82.0      | 103.0                | 89.0     | 96.0   | ~ Ditto            | ..                           | E.                     |
| 19    | 29.041     | 97.0         | 97.3    | 79.5      | 96.0                 | 88.0     | 92.0   | ~ all over         | ..                           | W.                     |
| 20    | 29.073     | 98.5         | 98.0    | 82.5      | 98.0                 | 87.0     | 92.5   | ~ scattered        | ..                           | N.                     |
| 21    | 29.921     | 100.9        | 101.0   | 82.5      | 100.0                | 87.0     | 93.5   | Hazy               | ..                           | N.                     |
| 22    | 29.005     | 97.2         | 94.8    | 81.2      | 95.2                 | 88.0     | 91.6   | ~ all over         | ..                           | N.                     |
| 23    | 28.977     | 100.6        | 100.4   | 81.7      | 99.5                 | 84.0     | 91.75  | Ditto              | 0.20                         | W.                     |
| 24    | 29.069     | 85.1         | 84.5    | 81.0      | 84.2                 | 83.9     | 84.05  | Ditto              | 0.30                         | W.                     |
| 25    | 29.135     | 90.2         | 91.0    | 82.0      | 89.9                 | 82.0     | 85.95  | Ditto              | 0.68                         | ..                     |
| 26    | 29.105     | 91.1         | 91.9    | 82.5      | 91.0                 | 80.0     | 85.5   | ~ scattered        | ..                           | ..                     |
| 27    | 29.091     | 88.0         | 86.4    | 81.0      | 91.0                 | 84.5     | 88.25  | ~ all over         | ..                           | S. E.                  |
| 28    | 29.129     | 84.8         | 82.4    | 79.0      | 82.1                 | 85.0     | 83.55  | ~ Ditto            | 1.10                         | N. E.                  |
| 29    | 29.095     | 82.1         | 81.1    | 79.1      | 89.5                 | 81.8     | 85.65  | ~ Ditto            | 1.10                         | E.                     |
| 30    | 29.037     | 84.9         | 84.5    | 81.0      | 85.5                 | 80.5     | 83.0   | ~ scattered        | ..                           | ..                     |
|       |            |              |         |           |                      |          |        | all over           | 0.38                         | N.W.                   |
| Mn.   | 29.045     | 100.28       | 99.48   | 80.12     | 99.62                | 88.17    | 93.89  | ..                 | 5.05                         | ..                     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|---------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                        | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                           | o    | o     |
| 1     | 29.755                                          | 29.843                                    | 29.661  | 0.182   | 85.5                          | 92.7                                        | 76.7 | 16.0  |
| 2     | .847                                            | .975                                      | .742    | .233    | 80.5                          | 90.4                                        | 70.7 | 19.7  |
| 3     | .883                                            | .965                                      | .780    | .185    | 78.9                          | 89.8                                        | 70.8 | 19.0  |
| 4     | .847                                            | .934                                      | .769    | .165    | 82.1                          | 91.4                                        | 72.6 | 18.8  |
| 5     | .800                                            | .893                                      | .674    | .219    | 80.4                          | 91.9                                        | 70.0 | 21.9  |
| 6     | .801                                            | .912                                      | .727    | .185    | 80.6                          | 89.3                                        | 72.0 | 17.3  |
| 7     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 8     | .767                                            | .838                                      | .665    | .173    | 83.2                          | 93.9                                        | 75.7 | 18.2  |
| 9     | .749                                            | .833                                      | .661    | .172    | 82.6                          | 91.8                                        | 75.2 | 16.6  |
| 10    | .731                                            | .792                                      | .665    | .127    | 84.9                          | 93.3                                        | 76.8 | 16.5  |
| 11    | .765                                            | .834                                      | .696    | .138    | 86.9                          | 95.6                                        | 80.4 | 15.2  |
| 12    | .764                                            | .839                                      | .690    | .149    | 88.0                          | 98.6                                        | 81.4 | 17.2  |
| 13    | .746                                            | .815                                      | .677    | .138    | 87.2                          | 94.3                                        | 81.4 | 12.9  |
| 14    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 15    | .784                                            | .852                                      | .688    | .164    | 86.6                          | 94.4                                        | 79.4 | 15.0  |
| 16    | .767                                            | .846                                      | .708    | .138    | 86.9                          | 93.4                                        | 80.8 | 12.6  |
| 17    | .789                                            | .867                                      | .703    | .164    | 87.1                          | 94.6                                        | 81.8 | 12.8  |
| 18    | .807                                            | .874                                      | .717    | .157    | 87.8                          | 95.6                                        | 81.3 | 14.3  |
| 19    | .759                                            | .841                                      | .652    | .189    | 88.6                          | 97.6                                        | 82.8 | 14.8  |
| 20    | .703                                            | .785                                      | .609    | .176    | 89.9                          | 100.4                                       | 82.4 | 18.0  |
| 21    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 22    | .616                                            | .699                                      | .519    | .180    | 90.2                          | 100.0                                       | 82.4 | 17.6  |
| 23    | .583                                            | .664                                      | .508    | .156    | 89.8                          | 99.6                                        | 82.2 | 17.4  |
| 24    | .555                                            | .631                                      | .467    | .164    | 89.5                          | 99.6                                        | 82.9 | 16.7  |
| 25    | .507                                            | .589                                      | .404    | .185    | 90.3                          | 100.7                                       | 82.0 | 18.7  |
| 26    | .462                                            | .523                                      | .377    | .146    | 91.0                          | 101.9                                       | 82.7 | 19.2  |
| 27    | .425                                            | .473                                      | .348    | .125    | 91.2                          | 99.8                                        | 83.8 | 16.0  |
| 28    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                             |      |       |
| 29    | .466                                            | .536                                      | .395    | .141    | 90.8                          | 98.2                                        | 84.8 | 13.4  |
| 30    | .499                                            | .551                                      | .441    | .110    | 84.1                          | 90.2                                        | 81.5 | 8.7   |
| 31    | .506                                            | .551                                      | .452    | .099    | 82.9                          | 90.2                                        | 80.5 | 9.7   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 80.5                            | 5.0                 | 78.0                | 7.5                          | 0.940                            | 10.03                                            | 2.69                                                                    | .0789                                                               |
| 2     | 75.1                            | 5.4                 | 72.4                | 8.1                          | .785                             | 8.46                                             | 2.52                                                                    | .770                                                                |
| 3     | 74.7                            | 4.2                 | 72.6                | 6.3                          | .790                             | 8.56                                             | 1.91                                                                    | .818                                                                |
| 4     | 76.1                            | 6.0                 | 73.1                | 9.0                          | .803                             | 8.63                                             | 2.88                                                                    | .750                                                                |
| 5     | 74.1                            | 6.3                 | 70.9                | 9.5                          | .748                             | 8.07                                             | 2.87                                                                    | .738                                                                |
| 6     | 76.5                            | 4.1                 | 74.4                | 6.2                          | .838                             | 9.04                                             | 1.97                                                                    | .821                                                                |
| 7     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 8     | 78.8                            | 4.4                 | 76.6                | 6.6                          | .899                             | 9.63                                             | 2.26                                                                    | .810                                                                |
| 9     | 78.5                            | 4.1                 | 76.4                | 6.2                          | .893                             | 9.60                                             | 2.08                                                                    | .822                                                                |
| 10    | 81.4                            | 3.5                 | 79.6                | 5.3                          | .989                             | 10.58                                            | 1.91                                                                    | .847                                                                |
| 11    | 81.5                            | 5.4                 | 78.8                | 8.1                          | .964                             | 10.27                                            | 2.98                                                                    | .775                                                                |
| 12    | 82.4                            | 5.6                 | 79.6                | 8.4                          | .989                             | 10.52                                            | 3.16                                                                    | .769                                                                |
| 13    | 82.7                            | 4.5                 | 80.4                | 6.8                          | 1.014                            | 10.79                                            | 2.58                                                                    | .807                                                                |
| 14    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 15    | 79.9                            | 6.7                 | 76.5                | 10.1                         | 0.896                            | 9.56                                             | 3.58                                                                    | .728                                                                |
| 16    | 81.6                            | 5.3                 | 78.9                | 8.0                          | .967                             | 10.30                                            | 2.95                                                                    | .777                                                                |
| 17    | 82.1                            | 5.0                 | 79.6                | 7.5                          | .989                             | 10.52                                            | 2.81                                                                    | .789                                                                |
| 18    | 82.4                            | 5.4                 | 79.7                | 8.1                          | .992                             | 10.55                                            | 3.05                                                                    | .776                                                                |
| 19    | 82.4                            | 6.2                 | 79.3                | 9.3                          | .979                             | 10.40                                            | 3.52                                                                    | .747                                                                |
| 20    | 82.7                            | 7.2                 | 79.1                | 10.8                         | .973                             | 10.30                                            | 4.16                                                                    | .712                                                                |
| 21    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 22    | 81.4                            | 8.8                 | 77.0                | 13.2                         | .910                             | 9.63                                             | 4.96                                                                    | .660                                                                |
| 23    | 81.7                            | 8.1                 | 77.6                | 12.2                         | .928                             | 9.83                                             | 4.59                                                                    | .682                                                                |
| 24    | 82.4                            | 7.1                 | 78.8                | 10.7                         | .964                             | 10.21                                            | 4.08                                                                    | .714                                                                |
| 25    | 82.8                            | 7.5                 | 79.0                | 11.3                         | .970                             | 10.27                                            | 4.36                                                                    | .702                                                                |
| 26    | 84.0                            | 7.0                 | 80.5                | 10.5                         | 1.017                            | 10.74                                            | 4.19                                                                    | .719                                                                |
| 27    | 84.2                            | 7.0                 | 80.7                | 10.5                         | .024                             | 10.80                                            | 4.22                                                                    | .719                                                                |
| 28    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 29    | 84.6                            | 6.2                 | 81.5                | 9.3                          | .050                             | 11.11                                            | 3.73                                                                    | .749                                                                |
| 30    | 81.1                            | 3.0                 | 79.6                | 4.5                          | 0.989                            | 10.58                                            | 1.63                                                                    | .867                                                                |
| 31    | 81.0                            | 1.9                 | 80.0                | 2.9                          | 1.001                            | 10.75                                            | 1.04                                                                    | .912                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.699                                    | 29.903                                                 | 29.442  | 0.461   | 81.2                       | 87.2                                                     | 71.6 | 15.6  |
| 1          | .687                                      | .876                                                   | .444    | .432    | 81.0                       | 86.8                                                     | 71.2 | 15.6  |
| 2          | .674                                      | .874                                                   | .433    | .441    | 80.6                       | 86.6                                                     | 71.2 | 15.4  |
| 3          | .673                                      | .858                                                   | .437    | .421    | 80.3                       | 86.6                                                     | 70.9 | 15.7  |
| 4          | .679                                      | .863                                                   | .437    | .426    | 80.2                       | 85.4                                                     | 70.8 | 14.6  |
| 5          | .689                                      | .877                                                   | .430    | .447    | 79.9                       | 84.8                                                     | 71.3 | 13.5  |
| 6          | .720                                      | .911                                                   | .478    | .433    | 80.2                       | 84.8                                                     | 71.5 | 13.3  |
| 7          | .733                                      | .931                                                   | .455    | .476    | 81.4                       | 86.6                                                     | 71.5 | 15.1  |
| 8          | .751                                      | .957                                                   | .461    | .496    | 84.2                       | 89.0                                                     | 73.8 | 15.2  |
| 9          | .760                                      | .965                                                   | .473    | .492    | 87.1                       | 91.3                                                     | 77.2 | 14.1  |
| 10         | .764                                      | .975                                                   | .461    | .514    | 89.5                       | 94.0                                                     | 80.1 | 13.9  |
| 11         | .746                                      | .947                                                   | .458    | .489    | 91.2                       | 96.9                                                     | 82.4 | 14.5  |
| Noon.      | .730                                      | .939                                                   | .453    | .486    | 92.6                       | 99.0                                                     | 82.4 | 16.6  |
| 1          | .705                                      | .910                                                   | .426    | .484    | 93.5                       | 100.2                                                    | 80.5 | 19.7  |
| 2          | .675                                      | .867                                                   | .403    | .464    | 94.0                       | 101.5                                                    | 82.0 | 19.5  |
| 3          | .652                                      | .837                                                   | .381    | .456    | 94.4                       | 101.9                                                    | 81.2 | 20.7  |
| 4          | .621                                      | .794                                                   | .357    | .437    | 93.8                       | 101.8                                                    | 81.4 | 20.4  |
| 5          | .613                                      | .780                                                   | .348    | .432    | 92.6                       | 99.8                                                     | 81.6 | 18.2  |
| 6          | .622                                      | .790                                                   | .352    | .438    | 89.8                       | 97.0                                                     | 77.6 | 19.4  |
| 7          | .641                                      | .805                                                   | .372    | .433    | 87.2                       | 93.9                                                     | 73.6 | 20.3  |
| 8          | .675                                      | .944                                                   | .423    | .521    | 84.9                       | 90.5                                                     | 70.0 | 20.5  |
| 9          | .702                                      | .975                                                   | .427    | .548    | 83.3                       | 88.9                                                     | 71.7 | 17.2  |
| 10         | .708                                      | .927                                                   | .438    | .489    | 82.6                       | 87.4                                                     | 70.7 | 16.7  |
| 11         | .706                                      | .930                                                   | .447    | .483    | 82.2                       | 87.2                                                     | 72.1 | 15.1  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 78.4                            | 2.8                 | 77.0                | 4.2                          | 0.910                            | 9.81                                             | 1.40                                                                    | 0.875                                                               |
| 1              | 78.3                            | 2.7                 | 76.9                | 4.1                          | .908                             | .78                                              | .36                                                                     | .878                                                                |
| 2              | 78.1                            | 2.5                 | 76.8                | 3.8                          | .905                             | .75                                              | .26                                                                     | .886                                                                |
| 3              | 78.1                            | 2.2                 | 77.0                | 3.3                          | .910                             | .83                                              | .08                                                                     | .901                                                                |
| 4              | 78.2                            | 2.0                 | 77.2                | 3.0                          | .916                             | .89                                              | 0.99                                                                    | .909                                                                |
| 5              | 78.1                            | 1.8                 | 77.2                | 2.7                          | .916                             | .89                                              | .89                                                                     | .917                                                                |
| 6              | 78.5                            | 1.7                 | 77.6                | 2.6                          | .928                             | 10.01                                            | .87                                                                     | .920                                                                |
| 7              | 79.1                            | 2.3                 | 77.9                | 3.5                          | .937                             | .08                                              | 1.19                                                                    | .894                                                                |
| 8              | 80.4                            | 3.8                 | 78.5                | 5.7                          | .955                             | .23                                              | 2.01                                                                    | .836                                                                |
| 9              | 81.5                            | 5.6                 | 78.7                | 8.4                          | .961                             | .24                                              | 3.09                                                                    | .768                                                                |
| 10             | 82.5                            | 7.0                 | 79.0                | 10.5                         | .970                             | .27                                              | 4.02                                                                    | .719                                                                |
| 11             | 83.0                            | 8.2                 | 78.9                | 12.3                         | .967                             | .22                                              | .80                                                                     | .680                                                                |
| Noon.          | 83.5                            | 9.1                 | 78.9                | 13.7                         | .967                             | .18                                              | 5.45                                                                    | .651                                                                |
| 1              | 83.4                            | 10.1                | 78.3                | 15.2                         | .949                             | 9.97                                             | 6.07                                                                    | .622                                                                |
| 2              | 83.6                            | 10.4                | 78.4                | 15.6                         | .952                             | .98                                              | .29                                                                     | .613                                                                |
| 3              | 82.9                            | 11.5                | 77.1                | 17.3                         | .913                             | .58                                              | .88                                                                     | .582                                                                |
| 4              | 83.1                            | 10.7                | 77.7                | 16.1                         | .931                             | .78                                              | .40                                                                     | .604                                                                |
| 5              | 82.7                            | 9.9                 | 77.7                | 14.9                         | .931                             | .80                                              | 5.83                                                                    | .627                                                                |
| 6              | 82.0                            | 7.8                 | 78.1                | 11.7                         | .943                             | .97                                              | 4.45                                                                    | .691                                                                |
| 7              | 80.9                            | 6.3                 | 77.7                | 9.5                          | .931                             | .90                                              | 3.47                                                                    | .741                                                                |
| 8              | 80.0                            | 4.9                 | 77.5                | 7.4                          | .925                             | .90                                              | 2.59                                                                    | .793                                                                |
| 9              | 79.6                            | 3.7                 | 77.7                | 5.6                          | .931                             | .98                                              | 1.95                                                                    | .837                                                                |
| 10             | 79.4                            | 3.2                 | 77.8                | 4.8                          | .934                             | 10.03                                            | .65                                                                     | .859                                                                |
| 11             | 79.2                            | 3.0                 | 77.7                | 4.5                          | .931                             | 10.00                                            | .54                                                                     | .867                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                                  |
|-------|-----------------------|-------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inc.  |                                   |                                                                                                                             |
| 1     | 131.8                 | ..    | S. occasionally high.             | Cloudy till 2 A. M. cloudy till 6 A. M. scattered \i till 11 A. M. cloudy afterwards.                                       |
| 2     | 133.9                 | ..    | S. (sharp.) or S. E.              | Cloudy the whole day with occasional lightning and thundering, also raining at 8 and 9 P. M.                                |
| 3     | 124.0                 | 0.66  | N. E. or S. (stormy)              | Cloudless till 8 A. M. cloudy afterwards with rain between 9 and 10 P. M.                                                   |
| 4     | 125.2                 | ..    | S.                                | Scattered clouds of various kinds till 5 P. M. cloudless afterwards.                                                        |
| 5     | 146.0                 | ..    | S. or S. E. or N. (high)          | Overcast till 7 A. M. scattered \i or \i till 4 P. M. cloudy afterwards with rain and lightning at 7 and 8 P. M.            |
| 6     | 126.0                 | 1.06  | S. E. (sharp) or N. E. [or S.     | Cloudless till 8 A. M. scattered \i or \i or \i afterwards.                                                                 |
| 7     | <i>Sunday.</i>        |       |                                   |                                                                                                                             |
| 8     | 146.0                 | ..    | S.                                | Cloudless till 7 A. M. scattered \i till 5 P. M. overcast afterwards with rain and lightning at 8 P. M.                     |
| 9     | 140.5                 | 0.52  | S.                                | Cloudless till 8 A. M. scattered \i till 4 P. M. overcast afterwards with thunder, lightning and rain between 7 and 9 P. M. |
| 10    | 145.0                 | 0.57  | S.                                | Cloudy the whole day, also drizzling at 10 P. M.                                                                            |
| 11    | 150.0                 | ..    | S. or W.                          | Overcast till 1 A. M. cloudless till 5 A. M. scattered \i and \i till 1 P. M. cloudless afterwards.                         |
| 12    | 136.0                 | ..    | S.                                | Cloudy till 3 A. M. cloudless till 8 P. M. overcast afterwards.                                                             |
| 13    | 149.4                 | ..    | S.                                | Cloudy till 1 A. M. cloudless till 8 P. M. cloudy afterwards.                                                               |
| 14    | <i>Sunday.</i>        |       |                                   |                                                                                                                             |
| 15    | 141.0                 | ..    | E. or S. E. or S.                 | Cloudy till 2 A. M. scattered \i till 1 P. M. cloudless till 5 P. M. scattered \i afterwards.                               |
| 16    | 138.7                 | ..    | S. E. or S. or N. E.              | Cloudy nearly the whole day, also drizzling at 11 A. M.                                                                     |
| 17    | 140.0                 | ..    | S.                                | Scattered \i or \i or \i till 2 P. M. overcast afterwards.                                                                  |
| 18    | 131.0                 | ..    | S.                                | Cloudy till 8 A. M. cloudless afterwards.                                                                                   |
| 19    | 139.0                 | ..    | S. E. or S.                       | Cloudless till 2 A. M. cloudy afterwards.                                                                                   |
| 20    | 150.0                 | ..    | S.                                | Cloudless.                                                                                                                  |



| Date. | Max Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                                                     |
|-------|----------------------|-------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 21    | o<br><i>Sunday.</i>  | Inc.  |                                   |                                                                                                                                                |
| 22    | 156.0                | ..    | S.                                | Cloudless.                                                                                                                                     |
| 23    | 157.0                | ..    | S.                                | Cloudless,                                                                                                                                     |
| 24    | 156.0                | ..    | S.                                | Cloudless.                                                                                                                                     |
| 25    | 152.2                | ..    | S. or S. E.                       | Cloudless.                                                                                                                                     |
| 26    | 158.0                | ..    | S. or S. E.                       | Cloudless.                                                                                                                                     |
| 27    | 143.6                | ..    | S. E. or E.                       | Cloudless till 10 A. M. scattered \i till 3 P. M. cloudless afterwards.                                                                        |
| 28    | <i>Sunday.</i>       |       |                                   |                                                                                                                                                |
| 29    | 157.0                | ..    | S. or E. or N. E.                 | Cloudless till 6 A. M. scattered \i till noon, scattered \i till 6 P. M. cloudless till 9 P. M. clouds and lightning on w. horizon afterwards. |
| 30    | ....                 | 0.38  | E. or S. E.                       | Cloudy till 1 A. M. cloudless till 5 A. M. cloudy afterwards, also raining at 11 A. M.                                                         |
| 31    | 134.0                | 0.56  | E. or N. E. or S.                 | Cloudy also raining between 11 A. M. and 7 P. M.                                                                                               |

\i Cirri \i cumuli,—i strati, \i i cirro-cumuli \i i cirro-strati \i i cumulo-strati  
 \i i nimbi,

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |        | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|--------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.  |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches | °                             | °                                                | °    | °     |
| 1     | 29.488                                          | 29.538                                    | 29.444  | 0.094  | 82.2                          | 88.2                                             | 80.0 | 8.2   |
| 2     | .450                                            | .509                                      | .387    | .122   | 80.4                          | 85.9                                             | 77.0 | 8.9   |
| 3     | .457                                            | .518                                      | .411    | .107   | 79.3                          | 80.5                                             | 78.4 | 2.1   |
| 4     | <i>Sunday.</i>                                  |                                           |         |        |                               |                                                  |      |       |
| 5     | .520                                            | .587                                      | .470    | .117   | 82.6                          | 89.4                                             | 75.0 | 14.4  |
| 6     | .511                                            | .582                                      | .393    | .189   | 84.3                          | 90.6                                             | 79.0 | 11.6  |
| 7     | .463                                            | .530                                      | .398    | .132   | 88.4                          | 94.8                                             | 83.2 | 11.6  |
| 8     | .498                                            | .565                                      | .448    | .117   | 87.4                          | 91.4                                             | 84.6 | 6.8   |
| 9     | .555                                            | .640                                      | .506    | .134   | 87.4                          | 95.2                                             | 81.2 | 14.0  |
| 10    | .579                                            | .633                                      | .494    | .139   | 86.1                          | 93.6                                             | 80.0 | 13.6  |
| 11    | <i>Sunday.</i>                                  |                                           |         |        |                               |                                                  |      |       |
| 12    | .430                                            | .484                                      | .377    | .107   | 86.3                          | 91.8                                             | 83.0 | 8.8   |
| 13    | .412                                            | .475                                      | .350    | .125   | 81.5                          | 84.2                                             | 79.0 | 5.2   |
| 14    | .472                                            | .534                                      | .424    | .110   | 85.9                          | 92.2                                             | 79.5 | 12.7  |
| 15    | .530                                            | .570                                      | .480    | .090   | 87.4                          | 93.2                                             | 79.8 | 13.4  |
| 16    | .546                                            | .585                                      | .483    | .102   | 84.0                          | 90.9                                             | 79.0 | 11.9  |
| 17    | .546                                            | .594                                      | .491    | .103   | 83.5                          | 90.1                                             | 78.8 | 11.3  |
| 18    | <i>Sunday.</i>                                  |                                           |         |        |                               |                                                  |      |       |
| 19    | .515                                            | .556                                      | .473    | .083   | 82.0                          | 85.0                                             | 80.0 | 5.0   |
| 20    | .571                                            | .640                                      | .523    | .117   | 81.0                          | 83.2                                             | 78.2 | 5.0   |
| 21    | .607                                            | .661                                      | .550    | .111   | 83.8                          | 88.7                                             | 80.5 | 8.2   |
| 22    | .583                                            | .624                                      | .526    | .098   | 85.8                          | 90.6                                             | 80.4 | 10.2  |
| 23    | .583                                            | .638                                      | .507    | .131   | 85.7                          | 90.6                                             | 83.0 | 7.6   |
| 24    | .583                                            | .618                                      | .535    | .083   | 84.6                          | 86.8                                             | 81.8 | 5.0   |
| 25    | <i>Sunday.</i>                                  |                                           |         |        |                               |                                                  |      |       |
| 26    | .609                                            | .659                                      | .525    | .134   | 85.2                          | 91.6                                             | 81.2 | 10.4  |
| 27    | .619                                            | .681                                      | .573    | .108   | 83.0                          | 88.2                                             | 81.3 | 6.9   |
| 28    | .711                                            | .765                                      | .669    | .096   | 79.8                          | 82.4                                             | 78.0 | 4.4   |
| 29    | .711                                            | .755                                      | .640    | .115   | 84.1                          | 90.0                                             | 79.6 | 10.4  |
| 30    | .658                                            | .716                                      | .579    | .137   | 85.2                          | 89.8                                             | 81.6 | 8.2   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | °                          | °                   | °                   | °                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 80.4                       | 1.8                 | 79.5                | 2.7                       | 0.986                         | 10.60                                         | 0.94                                                          | 0.919                                                     |
| 2     | 79.0                       | 1.4                 | 78.3                | 2.1                       | .949                          | 10.24                                         | 0.70                                                          | .936                                                      |
| 3     | 78.3                       | 1.0                 | 77.8                | 1.5                       | .934                          | 10.09                                         | 0.50                                                          | .953                                                      |
| 4     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 5     | 80.4                       | 2.2                 | 79.3                | 3.3                       | .979                          | 10.53                                         | 1.15                                                          | .902                                                      |
| 6     | 82.0                       | 2.3                 | 80.8                | 3.5                       | 1.027                         | 10.98                                         | 1.30                                                          | .894                                                      |
| 7     | 85.1                       | 3.3                 | 83.4                | 5.0                       | .114                          | 11.84                                         | 2.00                                                          | .855                                                      |
| 8     | 83.9                       | 3.5                 | 82.1                | 5.3                       | .069                          | 11.39                                         | 2.06                                                          | .847                                                      |
| 9     | 83.9                       | 3.5                 | 82.1                | 5.3                       | .069                          | 11.39                                         | 2.06                                                          | .847                                                      |
| 10    | 82.5                       | 3.6                 | 80.7                | 5.4                       | .024                          | 10.93                                         | 2.02                                                          | .844                                                      |
| 11    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 12    | 82.8                       | 3.5                 | 81.0                | 5.3                       | .034                          | 11.03                                         | 1.99                                                          | .847                                                      |
| 13    | 80.0                       | 1.5                 | 79.2                | 2.3                       | 0.976                         | 10.52                                         | 0.79                                                          | .930                                                      |
| 14    | 82.4                       | 3.5                 | 80.6                | 5.3                       | 1.021                         | 10.90                                         | 1.97                                                          | .847                                                      |
| 15    | 83.6                       | 3.8                 | 81.7                | 5.7                       | .057                          | 11.23                                         | 2.22                                                          | .835                                                      |
| 16    | 81.2                       | 2.8                 | 79.8                | 4.2                       | 0.995                         | 10.66                                         | 1.51                                                          | .876                                                      |
| 17    | 80.5                       | 3.0                 | 79.0                | 4.5                       | .970                          | 10.40                                         | 1.60                                                          | .867                                                      |
| 18    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 19    | 80.2                       | 1.8                 | 79.3                | 2.7                       | .979                          | 10.53                                         | 0.94                                                          | .918                                                      |
| 20    | 79.4                       | 1.6                 | 78.6                | 2.4                       | .958                          | 10.34                                         | 0.80                                                          | .928                                                      |
| 21    | 81.6                       | 2.2                 | 80.5                | 3.3                       | 1.017                         | 10.91                                         | 1.19                                                          | .902                                                      |
| 22    | 82.5                       | 3.3                 | 80.8                | 5.0                       | .027                          | 10.96                                         | 1.87                                                          | .854                                                      |
| 23    | 82.6                       | 3.1                 | 81.0                | 4.7                       | .034                          | 11.03                                         | 1.77                                                          | .862                                                      |
| 24    | 82.0                       | 2.6                 | 80.7                | 3.9                       | .024                          | 10.95                                         | 1.44                                                          | .884                                                      |
| 25    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 26    | 82.2                       | 3.0                 | 80.7                | 4.5                       | .024                          | 10.93                                         | 1.68                                                          | .867                                                      |
| 27    | 80.9                       | 2.1                 | 79.8                | 3.2                       | 0.995                         | 10.69                                         | 1.13                                                          | .904                                                      |
| 28    | 78.3                       | 1.5                 | 77.5                | 2.3                       | .925                          | 10.00                                         | 0.75                                                          | .930                                                      |
| 29    | 80.8                       | 3.3                 | 79.1                | 5.0                       | .973                          | 10.42                                         | 1.79                                                          | .853                                                      |
| 30    | 81.8                       | 3.4                 | 80.1                | 5.1                       | 1.005                         | 10.73                                         | 1.88                                                          | .851                                                      |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.149     | 85.8         | 85.8    | 80.5      | ..                   | ..       | N.                     | ~ scattered          |
| 2     | 29.149     | 85.0         | 85.2    | 80.0      | ..                   | ..       | N. E.                  | ~ ditto              |
| 3     | 29.211     | 90.0         | 90.6    | 82.6      | ..                   | ..       | E.                     | ~ towards h. and     |
| 4     | 29.203     | 90.5         | 91.0    | 82.5      | ..                   | ..       | E.                     | ~ in zenith          |
| 5     | 29.195     | 89.0         | 89.2    | 81.5      | ..                   | ..       | N. E.                  | ~ towards do.        |
| 6     | 29.063     | 87.8         | 88.0    | 80.8      | ..                   | ..       | N. E.                  | ~ in zenith          |
| 7     | 29.087     | 89.0         | 88.0    | 80.3      | ..                   | ..       | N. W.                  | ~ scattered          |
| 8     | 29.101     | 89.9         | 90.7    | 76.9      | ..                   | ..       | N.                     | ~ ditto              |
| 9     | 29.131     | 91.0         | 91.3    | 80.6      | ..                   | ..       | N. W.                  | ~ all over           |
| 10    | 29.147     | 92.5         | 93.4    | 79.4      | ..                   | ..       | N. W.                  | ~ scattered          |
| 11    | 29.131     | 94.0         | 94.5    | 79.9      | ..                   | ..       | N. W.                  | .....                |
| 12    | 29.079     | 96.5         | 97.9    | 80.0      | ..                   | ..       | N. W.                  | Clear                |
| 13    | 29.117     | 85.0         | 82.5    | 78.4      | ..                   | ..       | E.                     | Ditto                |
| 14    | 29.139     | 89.0         | 89.9    | 80.6      | ..                   | ..       | E.                     | Ditto                |
| 15    | 29.167     | 89.5         | 87.3    | 83.3      | ..                   | ..       | E.                     | ~ all over           |
| 16    | 29.163     | 85.2         | 84.0    | 80.0      | ..                   | ..       | N. E.                  | ~ scattered          |
| 17    | 29.051     | 86.5         | 87.0    | 82.0      | ..                   | ..       | S. E.                  | ~ ditto              |
| 18    | 29.097     | 85.0         | 85.0    | 81.2      | ..                   | ..       | S. E.                  | ~ ditto              |
| 19    | 29.171     | 84.1         | 83.1    | 81.1      | ..                   | ..       | N. W.                  | ~ scattered all over |
| 20    | 29.145     | 87.9         | 88.3    | 81.0      | ..                   | ..       | E.                     | ~ all over           |
| 21    | 29.153     | 89.3         | 90.4    | 81.9      | ..                   | ..       | S. E.                  | ~ all over           |
| 22    | 29.255     | 91.0         | 91.5    | 83.5      | ..                   | ..       | S. E.                  | ~ scattered          |
| 23    | 29.274     | 90.5         | 91.0    | 81.0      | ..                   | ..       | E.                     | ~ ditto              |
| 24    | 29.171     | 91.5         | 91.2    | 83.5      | ..                   | ..       | N. E.                  | ~ ditto              |
| 25    | 29.155     | 87.8         | 88.2    | 81.7      | ..                   | ..       | E.                     | ~ all over           |
| 26    | 29.195     | 86.5         | 86.4    | 81.0      | ..                   | ..       | N.                     | ~ scattered in h.    |
| 27    | 29.115     | 87.5         | 87.5    | 80.0      | ..                   | ..       | E.                     | ~ towards hor.       |
| 28    | 29.047     | 86.9         | 86.9    | 78.6      | ..                   | ..       | S. E.                  | ~ all over           |
| 29    | 29.081     | 80.5         | 80.7    | 78.4      | ..                   | ..       | S. E.                  | ~ ditto              |
| 30    | 29.093     | 83.0         | 83.6    | 79.0      | ..                   | ..       | W.                     | ~ ditto              |
| 31    | 29.103     | 82.0         | 82.2    | 78.0      | ..                   | ..       | E.                     | ~ scattered          |
| Mean. | 29.139     | 88.0         | 88.1    | 80.6      | ..                   | ..       | ..                     | ~ ditto              |

Barometer observations corrected for capillarity only.

Symbols. {  
 \ Cirris.  
 \ Cirro strata.  
 > Cumuli.  
 > Cumulo strata.  
 ~ Nimbi or Nimbus.



*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.                   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                                      |
| 1     | 29.135     | 86.5         | 86.2    | 81.0      | ..                   | ..       | N.                     | ↘ towards E. S. W. &<br>↘ towards N. |
| 2     | 29.133     | 87.0         | 87.3    | 81.6      | ..                   | ..       | E.                     | ↘ scattered                          |
| 3     | 29.203     | 91.7         | 91.9    | 82.8      | ..                   | ..       | E.                     | ↘ all over                           |
| 4     | 29.191     | 91.2         | 90.2    | 82.6      | ..                   | ..       | E.                     | ↘ ditto                              |
| 5     | 29.183     | 89.7         | 90.0    | 82.0      | ..                   | ..       | N.                     | ↘ scattered                          |
| 6     | 29.035     | 92.0         | 93.0    | 81.8      | ..                   | ..       | N.                     | ↘ ditto                              |
| 7     | 29.077     | 91.3         | 91.6    | 77.9      | ..                   | ..       | N.                     | ↘ ditto                              |
| 8     | 29.107     | 92.7         | 93.1    | 77.3      | ..                   | ..       | N. W.                  | ↘ ditto                              |
| 9     | 29.111     | 95.9         | 96.7    | 81.2      | ..                   | ..       | N. W.                  | ↘ ditto all over                     |
| 10    | 29.147     | 95.5         | 96.4    | 80.0      | ..                   | ..       | N. W.                  | ↘ scattered                          |
| 11    | 29.115     | 96.3         | 97.3    | 81.2      | ..                   | ..       | N. W.                  | ↘ ditto                              |
| 12    | 29.057     | 100.0        | 100.4   | 80.2      | ..                   | ..       | N.                     | ↘ ditto                              |
| 13    | 29.113     | 86.2         | 85.1    | 77.9      | ..                   | ..       | E.                     | ↘ all over                           |
| 14    | 29.107     | 92.0         | 92.8    | 80.9      | ..                   | ..       | N. E.                  | ↘ scattered                          |
| 15    | 29.137     | 90.8         | 91.5    | 81.3      | ..                   | ..       | S. E.                  | ↘ all over                           |
| 16    | 29.089     | 86.0         | 84.0    | 80.0      | ..                   | ..       | N. E.                  | ↘ ditto                              |
| 17    | 29.027     | 89.9         | 90.0    | 82.4      | ..                   | ..       | N. W.                  | ↘ ditto                              |
| 18    | 29.069     | 86.6         | 86.6    | 81.5      | ..                   | ..       | S. E.                  | ↘ scattered all over                 |
| 19    | 29.147     | 85.7         | 86.3    | 81.5      | ..                   | ..       | N. E.                  | ↘ all over                           |
| 20    | 29.119     | 90.0         | 90.8    | 82.0      | ..                   | ..       | N. E.                  | ↘ ditto                              |
| 21    | 29.131     | 92.0         | 92.4    | 81.0      | ..                   | ..       | E.                     | ↘ scattered                          |
| 22    | 29.229     | 93.7         | 94.0    | 83.0      | ..                   | ..       | S. E.                  | ↘ all over                           |
| 23    | 29.209     | 94.5         | 95.6    | 82.0      | ..                   | ..       | N. E.                  | ↘ scattered                          |
| 24    | 29.145     | 92.5         | 92.0    | 84.5      | ..                   | ..       | E.                     | ↘ all over                           |
| 25    | 29.143     | 90.3         | 90.8    | 82.5      | ..                   | ..       | E.                     | ↘ towards hor.                       |
| 26    | 29.175     | 87.7         | 87.8    | 81.9      | ..                   | ..       | E.                     | ↘ all over                           |
| 27    | 29.097     | 89.6         | 90.2    | 80.0      | ..                   | ..       | E.                     | ↘ all over                           |
| 28    | 29.029     | 89.5         | 90.2    | 80.0      | ..                   | ..       | S. E.                  | ↘ ditto                              |
| 29    | 29.077     | 82.0         | 83.3    | 78.9      | ..                   | ..       | E.                     | ↘ ditto                              |
| 30    | 29.075     | 91.0         | 91.5    | 80.3      | ..                   | ..       | N. W.                  | ↘ scattered                          |
| 31    | 29.085     | 90.2         | 90.4    | 80.5      | ..                   | ..       | E.                     | ↘ scattered                          |
| Mean. | 29.119     | 90.6         | 90.9    | 81.0      | ..                   | ..       | ..                     | .....                                |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauges.           |                              |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------|------------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | Direction of the Wind. | 3 Ft. 2 In. from the ground. |
| 1     | 29.063     | 91.7         | 92.5    | 82.5      | 91.5                 | 81.5     | 86.5  | scattered          | ..                     | N.                           |
| 2     | 29.065     | 90.5         | 91.0    | 82.7      | 90.0                 | 80.6     | 85.3  | ditto              | ..                     | E.                           |
| 3     | 29.141     | 96.5         | 96.7    | 83.2      | 97.0                 | 84.0     | 90.5  | all over           | ..                     | E.                           |
| 4     | 29.111     | 89.5         | 88.7    | 81.0      | 88.0                 | 84.0     | 86.0  | towards E.         | ..                     | N. E.                        |
| 5     | 29.103     | 92.0         | 92.5    | 82.3      | 92.5                 | 84.0     | 88.25 | scattered          | ..                     | NNE.                         |
| 6     | 28.967     | 96.9         | 97.1    | 83.7      | 96.2                 | 83.5     | 89.85 | ditto              | ..                     | S. W.                        |
| 7     | 28.985     | 95.1         | 95.7    | 79.9      | 95.0                 | 84.5     | 89.75 | in zenith          | ..                     | N.W.                         |
| 8     | 29.027     | 97.0         | 96.8    | 80.4      | 95.5                 | 85.5     | 90.5  | scattered          | ..                     | N.W.                         |
| 9     | 29.049     | 89.7         | 88.7    | 79.5      | 96.0                 | 85.0     | 90.5  | all over           | ..                     | N.W.                         |
| 10    | 29.036     | 99.5         | 99.5    | 81.1      | 98.0                 | 85.5     | 91.75 | ditto              | ..                     | N.                           |
| 11    | 29.025     | 101.9        | 102.3   | 81.8      | 100.5                | 87.5     | 94.0  | ditto              | ..                     | N.W.                         |
| 12    | 28.963     | 103.6        | 103.3   | 82.0      | 101.5                | 89.0     | 95.25 | ditto              | ..                     | N.                           |
| 13    | 29.053     | 89.5         | 89.0    | 79.0      | 90.0                 | 82.8     | 86.4  | ditto              | ..                     | E.                           |
| 14    | 29.039     | 90.5         | 89.4    | 80.9      | 92.5                 | 86.0     | 89.25 | towards W          | ..                     | E.                           |
| 15    | 29.053     | 88.8         | 89.0    | 84.1      | 90.0                 | 88.0     | 89.0  | & scattered        | ..                     | E.                           |
| 16    | 29.015     | 85.8         | 82.5    | 79.2      | 84.0                 | 84.5     | 84.25 | all over           | 0572                   | E.                           |
| 17    | 28.945     | 81.5         | 81.5    | 80.0      | 88.0                 | 81.0     | 84.5  | ditto              | ..                     | N.                           |
| 18    | 28.985     | 89.6         | 90.3    | 81.1      | 89.0                 | 79.5     | 84.25 | sc. all over       | 2022                   | N.W.                         |
| 19    | 29.057     | 89.0         | 88.9    | 84.0      | 89.0                 | 80.8     | 84.9  | ditto              | ..                     | N. E.                        |
| 20    | 29.033     | 92.5         | 92.6    | 81.5      | 92.0                 | 81.5     | 86.75 | all over           | ..                     | E.                           |
| 21    | 29.061     | 94.8         | 94.8    | 81.3      | 94.0                 | 83.2     | 88.6  | scattered          | ..                     | E.                           |
| 22    | 29.147     | 95.7         | 95.9    | 82.5      | 95.0                 | 84.5     | 89.75 | all over           | ..                     | E.                           |
| 23    | 29.113     | 97.8         | 97.8    | 82.6      | 97.2                 | 87.0     | 92.1  | scattered          | ..                     | N. E.                        |
| 24    | 29.099     | 93.6         | 88.9    | 80.9      | 90.5                 | 89.0     | 89.75 | all over           | 0352                   | E.                           |
| 25    | 29.059     | 90.7         | 87.7    | 81.8      | 90.0                 | 81.5     | 85.75 | towards w          | 0072                   | W.                           |
| 26    | 29.065     | 86.9         | 86.6    | 80.5      | 87.0                 | 82.0     | 84.5  | all over           | ..                     | S. E.                        |
| 27    | 29.023     | 92.0         | 92.3    | 81.7      | 91.5                 | 82.5     | 87.0  | scattered          | ..                     | S. E.                        |
| 28    | 28.945     | 92.2         | 92.7    | 80.1      | 91.3                 | 82.5     | 86.9  | ditto              | ..                     | S. E.                        |
| 29    | 29.047     | 84.2         | 84.2    | 79.2      | 83.4                 | 78.0     | 80.7  | all over           | ..                     | S. E.                        |
| 30    | 29.013     | 94.0         | 94.7    | 95.0      | 95.0                 | 79.5     | 87.25 | scattered          | ..                     | N.W.                         |
| 31    | 29.013     | 93.5         | 93.0    | 80.9      | 94.0                 | 80.0     | 87.0  | scattered          | ..                     | E.                           |
| Mn.   | 29.041     | 92.4         | 92.1    | 81.8      | 92.4                 | 83.5     | 87.95 | ....               | 3078                   | ..                           |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Hourly Means, &c., of the observations and of the hygrometrical elements  
dependent thereon, (Continued.)

| Hour.          | Mean Height of the Baro-<br>meter at 32° Fahr. | Range of the Barometer for<br>each hour during<br>the month. |         |         | Mean Dry Bulb Thermo-<br>meter. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|------------------------------------------------|--------------------------------------------------------------|---------|---------|---------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                | Max.                                                         | Min.    | Diff.   |                                 | Max.                                                           | Min. | Diff. |
|                | Inches.                                        | Inches.                                                      | Inches. | Inches. | °                               | °                                                              | °    | °     |
| Mid-<br>night. | 29.561                                         | 29.741                                                       | 29.428  | 0.313   | 81.9                            | 86.6                                                           | 75.0 | 11.6  |
| 1              | .550                                           | .753                                                         | .407    | .346    | 81.8                            | 86.4                                                           | 75.0 | 11.4  |
| 2              | .538                                           | .743                                                         | .386    | .357    | 81.8                            | 85.7                                                           | 75.2 | 10.5  |
| 3              | .528                                           | .734                                                         | .354    | .380    | 81.5                            | 85.4                                                           | 76.4 | 9.0   |
| 4              | .525                                           | .732                                                         | .354    | .378    | 81.5                            | 85.4                                                           | 78.2 | 7.2   |
| 5              | .532                                           | .721                                                         | .350    | .371    | 81.4                            | 85.4                                                           | 78.2 | 7.2   |
| 6              | .546                                           | .743                                                         | .359    | .384    | 81.4                            | 85.0                                                           | 78.3 | 6.7   |
| 7              | .562                                           | .751                                                         | .398    | .353    | 82.1                            | 85.6                                                           | 78.4 | 7.2   |
| 8              | .578                                           | .755                                                         | .440    | .315    | 83.4                            | 87.4                                                           | 78.6 | 8.8   |
| 9              | .585                                           | .760                                                         | .444    | .316    | 84.7                            | 90.0                                                           | 79.6 | 10.4  |
| 10             | .586                                           | .765                                                         | .441    | .324    | 85.9                            | 91.6                                                           | 79.3 | 12.3  |
| 11             | .580                                           | .758                                                         | .442    | .316    | 87.0                            | 93.1                                                           | 79.8 | 13.3  |
| Noon.          | .569                                           | .746                                                         | .448    | .298    | 88.0                            | 93.4                                                           | 80.1 | 13.3  |
| 1              | .553                                           | .741                                                         | .423    | .318    | 88.2                            | 94.2                                                           | 79.0 | 15.2  |
| 2              | .531                                           | .723                                                         | .409    | .314    | 88.3                            | 95.2                                                           | 78.8 | 16.4  |
| 3              | .510                                           | .698                                                         | .387    | .311    | 88.0                            | 95.2                                                           | 79.4 | 15.8  |
| 4              | .494                                           | .676                                                         | .374    | .302    | 86.8                            | 94.2                                                           | 77.0 | 17.2  |
| 5              | .495                                           | .678                                                         | .361    | .317    | 86.3                            | 94.8                                                           | 78.0 | 16.8  |
| 6              | .504                                           | .696                                                         | .373    | .323    | 84.7                            | 92.4                                                           | 78.0 | 14.4  |
| 7              | .523                                           | .694                                                         | .391    | .303    | 83.7                            | 91.2                                                           | 78.6 | 12.6  |
| 8              | .542                                           | .704                                                         | .399    | .305    | 83.3                            | 89.6                                                           | 78.7 | 10.9  |
| 9              | .564                                           | .710                                                         | .418    | .292    | 82.5                            | 88.3                                                           | 78.8 | 9.5   |
| 10             | .579                                           | .718                                                         | .442    | .276    | 82.3                            | 87.7                                                           | 78.7 | 9.0   |
| 11             | .579                                           | .741                                                         | .443    | .298    | 82.1                            | 86.8                                                           | 78.8 | 8.0   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Hourly Means, &c., of the observations and of the hygrometrical elements  
dependent thereon, (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 80.3                            | 1.6                 | 79.5                | 2.4                          | .0986                            | 10.62                                            | .082                                                                    | .0928                                                               |
| 1              | 80.3                            | 1.5                 | 79.5                | 2.3                          | .986                             | .62                                              | .78                                                                     | .932                                                                |
| 2              | 80.3                            | 1.5                 | 79.5                | 2.3                          | .986                             | .62                                              | .78                                                                     | .932                                                                |
| 3              | 80.2                            | 1.3                 | 79.5                | 2.0                          | .986                             | .62                                              | .69                                                                     | .939                                                                |
| 4              | 80.2                            | 1.3                 | 79.5                | 2.0                          | .986                             | .62                                              | .69                                                                     | .939                                                                |
| 5              | 80.1                            | 1.3                 | 79.4                | 2.0                          | .983                             | .58                                              | .69                                                                     | .939                                                                |
| 6              | 80.2                            | 1.2                 | 79.6                | 1.8                          | .989                             | .65                                              | .62                                                                     | .945                                                                |
| 7              | 80.7                            | 1.4                 | 80.0                | 2.1                          | 1.001                            | .77                                              | .74                                                                     | .936                                                                |
| 8              | 81.2                            | 2.2                 | 80.1                | 3.3                          | .005                             | .77                                              | 1.19                                                                    | .901                                                                |
| 9              | 81.8                            | 2.9                 | 80.3                | 4.4                          | .011                             | .82                                              | .60                                                                     | .871                                                                |
| 10             | 82.6                            | 3.3                 | 80.9                | 5.0                          | .030                             | .99                                              | .88                                                                     | .854                                                                |
| 11             | 83.0                            | 4.0                 | 81.0                | 6.0                          | .034                             | 11.01                                            | 2.28                                                                    | .828                                                                |
| Noon.          | 83.5                            | 4.5                 | 81.2                | 6.8                          | .040                             | .05                                              | .63                                                                     | .808                                                                |
| 1              | 83.5                            | 4.7                 | 81.1                | 7.1                          | .037                             | .01                                              | .75                                                                     | .800                                                                |
| 2              | 83.5                            | 4.8                 | 81.1                | 7.2                          | .037                             | .01                                              | .79                                                                     | .798                                                                |
| 3              | 83.6                            | 4.4                 | 81.4                | 6.6                          | .047                             | .11                                              | .57                                                                     | .812                                                                |
| 4              | 82.9                            | 3.9                 | 80.9                | 5.9                          | .030                             | 10.97                                            | .24                                                                     | .830                                                                |
| 5              | 82.4                            | 3.9                 | 80.4                | 5.9                          | .014                             | .81                                              | .21                                                                     | .830                                                                |
| 6              | 81.5                            | 3.2                 | 79.9                | 4.8                          | 0.998                            | .67                                              | 1.75                                                                    | .859                                                                |
| 7              | 81.0                            | 2.7                 | 79.6                | 4.1                          | .989                             | .60                                              | .47                                                                     | .878                                                                |
| 8              | 80.9                            | 2.4                 | 79.7                | 3.6                          | .992                             | .63                                              | .30                                                                     | .891                                                                |
| 9              | 80.6                            | 1.9                 | 79.6                | 2.9                          | .989                             | .63                                              | .10                                                                     | .913                                                                |
| 10             | 80.5                            | 1.8                 | 79.6                | 2.7                          | .989                             | .63                                              | 0.95                                                                    | .918                                                                |
| 11             | 80.4                            | 1.7                 | 79.5                | 2.6                          | .986                             | .60                                              | .91                                                                     | .921                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
Month of June, 1854.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                          |
|-------|-----------------------|-------|-----------------------------------|---------------------------------------------------------------------|
| 1     | o                     | Inc   |                                   |                                                                     |
| 2     | ..                    | ..    | N. E. or N.N.E. or S.W.           | Cloudy and raining occasionally.                                    |
| 3     | ..                    | 1.92  | Calm or S. E. or S. W.            | Ditto ditto ditto.                                                  |
| 4     | ..                    | 3.66  | Calm or S. W. or W.               | Cloudy and raining constantly.                                      |
| 5     | Sunday.               | 3 32  | .....                             |                                                                     |
| 6     | ..                    | ..    | S. E. or E. or S. or N.           | Cloudy and occasional rain with thunder and lightning.              |
| 7     | ..                    | 0.36  | S. or W.                          | Ditto ditto ditto.                                                  |
| 8     | 142.0                 | 0.16  | Calm or S. or S. W.               | Cloudy.                                                             |
| 9     | 125.0                 | ..    | Calm or S. or S. E.               | Overcast.                                                           |
| 10    | 139.0                 | ..    | Calm or S. E. or S.               | Cloudy and rain between 5 and 6 P. M.                               |
| 11    | 137.0                 | 0.65  | S. E. or S.                       | Cloudy.                                                             |
| 12    | Sunday.               | ..    | .....                             |                                                                     |
| 13    | 121.0                 | ..    | S.                                | Overcast and Drizzling at 7 P. M.                                   |
| 14    | ..                    | 2.13  | N. W.                             | Overcast and raining occasionally.                                  |
| 15    | 139.0                 | ..    | S. or S. W. or W.                 | Overcast.                                                           |
| 16    | 117.0                 | ..    | Calm or W. or S. W.               | Cloudy with rain between 8 and 9 P. M.                              |
| 17    | 133.0                 | 0.12  | S. E. or S.                       | Overcast and raining from 7 P. M. till midnight.                    |
| 18    | 142.5                 | 1.16  | S.                                | Cloudy and Drizzling at 3 A. M. 9 and 10 P. M.                      |
| 19    | Sunday                | ..    | .....                             |                                                                     |
| 20    | ..                    | 0.60  | E. or S. E. or S.                 | Cloudy and raining or Drizzling constantly.                         |
| 21    | ..                    | 0.46  | S. E.                             | Ditto ditto ditto.                                                  |
| 22    | ..                    | ..    | S. E. or S. W. or S.S.E.          | Cloudless till 2 A. M. overcast afterwards.                         |
| 23    | 136.5                 | ..    | S. E. occasionally sharp.         | Cloudy.                                                             |
| 24    | 118.0                 | ..    | S. sharp or E.                    | Ditto.                                                              |
| 25    | ..                    | ..    | S. E. sharp in the M.             | Overcast and Drizzling at 2 A. M.                                   |
| 26    | Sunday.               | 0.42  | .....                             |                                                                     |
| 27    | 147.0                 | ..    | S. or N. E. or S.                 | Cloudless till 5 A. M. afterwards cloudy with occasional Drizzling. |
| 28    | 119.0                 | 0.88  | S. or calm or S. E.               | Cloudy and raining between 3 P. M. and midnight.                    |
| 29    | ..                    | 0.78  | S.                                | Cloudy and constantly raining or Drizzling.                         |
| 30    | 148.0                 | 0.20  | S. E. or S.                       | Cloudy with little Drizzling.                                       |
|       | 138.0                 | ..    | S. E. or S.                       | Cloudless till 3 A. M. cloudy and little Drizzling at 10 P. M.      |

∩ Cirri ∪ cirro-strati, ∩ cumuli, ∩ cumulo-strati, ∪ nimbi, — strati, ∪ cirro-cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.619                                          | 29.663                                    | 29.543  | 0.120   | 85.1                          | 90.0                                          | 82.7 | 7.3   |
| 2     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 3     | .608                                            | .655                                      | .544    | .111    | 85.5                          | 90.2                                          | 81.4 | 8.8   |
| 4     | .629                                            | .671                                      | .580    | .091    | 82.8                          | 86.6                                          | 80.8 | 5.8   |
| 5     | .595                                            | .645                                      | .531    | .114    | 84.0                          | 89.8                                          | 79.8 | 10.0  |
| 6     | .530                                            | .569                                      | .463    | .106    | 84.8                          | 91.0                                          | 81.5 | 9.5   |
| 7     | .508                                            | .545                                      | .453    | .092    | 85.7                          | 90.4                                          | 82.7 | 7.7   |
| 8     | .524                                            | .558                                      | .486    | .072    | 83.7                          | 84.6                                          | 81.7 | 2.9   |
| 9     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 10    | .577                                            | .610                                      | .516    | .094    | 83.0                          | 88.1                                          | 76.2 | 11.9  |
| 11    | .551                                            | .600                                      | .487    | .113    | 84.8                          | 90.3                                          | 81.3 | 9.0   |
| 12    | .535                                            | .581                                      | .478    | .103    | 83.8                          | 88.7                                          | 81.5 | 7.2   |
| 13    | .536                                            | .584                                      | .461    | .123    | 83.0                          | 88.8                                          | 80.1 | 8.7   |
| 14    | .570                                            | .613                                      | .518    | .095    | 82.6                          | 87.3                                          | 79.8 | 7.5   |
| 15    | .593                                            | .660                                      | .530    | .130    | 83.3                          | 89.0                                          | 80.0 | 9.0   |
| 16    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 17    | .448                                            | .509                                      | .352    | .157    | 84.9                          | 91.0                                          | 81.0 | 10.0  |
| 18    | .440                                            | .500                                      | .370    | .130    | 82.8                          | 87.2                                          | 81.0 | 6.2   |
| 19    | .500                                            | .576                                      | .442    | .134    | 82.9                          | 87.3                                          | 77.6 | 9.7   |
| 20    | .546                                            | .600                                      | .479    | .121    | 84.4                          | 89.5                                          | 80.6 | 8.9   |
| 21    | .582                                            | .654                                      | .503    | .151    | 84.2                          | 89.2                                          | 80.4 | 8.8   |
| 22    | .635                                            | .699                                      | .572    | .127    | 84.8                          | 91.6                                          | 80.6 | 11.0  |
| 23    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 24    | .595                                            | .649                                      | .523    | .126    | 84.2                          | 85.4                                          | 83.0 | 2.4   |
| 25    | .495                                            | .577                                      | .407    | .170    | 82.9                          | 87.6                                          | 80.5 | 7.1   |
| 26    | .494                                            | .554                                      | .450    | .104    | 80.2                          | 83.0                                          | 78.6 | 4.4   |
| 27    | .551                                            | .611                                      | .504    | .107    | 80.1                          | 82.8                                          | 78.8 | 4.0   |
| 28    | .593                                            | .647                                      | .545    | .102    | 83.3                          | 89.8                                          | 79.2 | 10.6  |
| 29    | .600                                            | .674                                      | .513    | .161    | 87.3                          | 93.6                                          | 82.1 | 11.5  |
| 30    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 31    | .452                                            | .517                                      | .359    | .158    | 83.7                          | 90.7                                          | 80.0 | 10.7  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 82.6                            | 2.5                 | 81.3                | 3.8                          | 1.043                            | 11.15                                            | 1.42                                                                    | 0.887                                                               |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 3     | 82.0                            | 3.5                 | 80.2                | 5.3                          | 1.008                            | 10.77                                            | 1.95                                                                    | .847                                                                |
| 4     | 80.8                            | 2.0                 | 79.8                | 3.0                          | 0.995                            | 10.69                                            | 1.06                                                                    | .910                                                                |
| 5     | 81.0                            | 3.0                 | 79.5                | 4.5                          | 0.986                            | 10.55                                            | 1.62                                                                    | .867                                                                |
| 6     | 82.1                            | 2.7                 | 80.7                | 4.1                          | 1.024                            | 10.95                                            | 1.51                                                                    | .879                                                                |
| 7     | 82.6                            | 3.1                 | 81.0                | 4.7                          | 1.034                            | 11.03                                            | 1.77                                                                    | .862                                                                |
| 8     | 82.0                            | 1.7                 | 81.1                | 2.6                          | 1.037                            | 11.10                                            | 0.97                                                                    | .920                                                                |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 10    | 80.7                            | 2.3                 | 79.5                | 3.5                          | 0.986                            | 10.57                                            | 1.25                                                                    | .894                                                                |
| 11    | 82.1                            | 2.7                 | 80.7                | 4.1                          | 1.024                            | 10.95                                            | 1.51                                                                    | .879                                                                |
| 12    | 81.2                            | 2.6                 | 79.9                | 3.9                          | 0.998                            | 10.69                                            | 1.41                                                                    | .883                                                                |
| 13    | 80.6                            | 2.4                 | 79.4                | 3.6                          | 0.983                            | 10.54                                            | 1.28                                                                    | .892                                                                |
| 14    | 80.7                            | 1.9                 | 79.7                | 2.9                          | 0.992                            | 10.66                                            | 1.02                                                                    | .913                                                                |
| 15    | 81.2                            | 2.1                 | 80.1                | 3.2                          | 1.005                            | 10.77                                            | 1.16                                                                    | .903                                                                |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 17    | 81.4                            | 3.5                 | 79.6                | 5.3                          | 0.989                            | 10.58                                            | 1.91                                                                    | .847                                                                |
| 18    | 80.4                            | 2.4                 | 79.2                | 3.6                          | 0.976                            | 10.48                                            | 1.27                                                                    | .892                                                                |
| 19    | 80.3                            | 2.6                 | 79.0                | 3.9                          | 0.970                            | 10.42                                            | 1.37                                                                    | .884                                                                |
| 20    | 81.1                            | 3.3                 | 79.4                | 5.0                          | 0.983                            | 10.51                                            | 1.80                                                                    | .854                                                                |
| 21    | 81.4                            | 2.8                 | 80.0                | 4.2                          | 1.001                            | 10.72                                            | 1.52                                                                    | .876                                                                |
| 22    | 81.7                            | 3.1                 | 80.1                | 4.7                          | 1.005                            | 10.73                                            | 1.73                                                                    | .861                                                                |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 24    | 81.8                            | 2.4                 | 80.6                | 3.6                          | 1.021                            | 10.92                                            | 1.32                                                                    | .892                                                                |
| 25    | 80.7                            | 2.2                 | 79.6                | 3.3                          | 0.989                            | 10.63                                            | 1.16                                                                    | .902                                                                |
| 26    | 78.8                            | 1.4                 | 78.1                | 2.1                          | 0.943                            | 10.18                                            | 0.70                                                                    | .936                                                                |
| 27    | 78.8                            | 1.3                 | 78.1                | 2.0                          | 0.943                            | 10.18                                            | 0.66                                                                    | .939                                                                |
| 28    | 81.5                            | 1.8                 | 80.6                | 2.7                          | 1.021                            | 10.94                                            | 0.99                                                                    | .917                                                                |
| 29    | 84.2                            | 3.1                 | 82.6                | 4.7                          | 1.087                            | 11.56                                            | 1.85                                                                    | .862                                                                |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 31    | 81.1                            | 2.6                 | 79.8                | 3.9                          | 0.995                            | 10.66                                            | 1.41                                                                    | .883                                                                |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahrt. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|--------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                            | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                    | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.572                                     | 29.645                                                 | 29.434  | 0.211   | 81.9                       | 84.2                                                     | 76.2 | 8.0   |
| 1          | .559                                       | .635                                                   | .410    | .225    | 81.7                       | 84.4                                                     | 77.0 | 7.4   |
| 2          | .547                                       | .625                                                   | .403    | .222    | 81.5                       | 84.2                                                     | 77.2 | 7.0   |
| 3          | .540                                       | .622                                                   | .406    | .216    | 81.3                       | 84.2                                                     | 77.6 | 6.6   |
| 4          | .537                                       | .617                                                   | .420    | .197    | 81.1                       | 83.9                                                     | 77.6 | 6.3   |
| 5          | .540                                       | .621                                                   | .425    | .196    | 80.8                       | 83.6                                                     | 77.6 | 6.0   |
| 6          | .553                                       | .639                                                   | .451    | .188    | 80.9                       | 83.6                                                     | 78.2 | 5.4   |
| 7          | .570                                       | .665                                                   | .466    | .199    | 81.7                       | 83.9                                                     | 79.2 | 4.7   |
| 8          | .588                                       | .693                                                   | .476    | .217    | 83.0                       | 85.6                                                     | 79.6 | 6.0   |
| 9          | .593                                       | .699                                                   | .483    | .216    | 84.6                       | 87.6                                                     | 80.2 | 7.4   |
| 10         | .592                                       | .696                                                   | .476    | .220    | 85.8                       | 88.8                                                     | 82.4 | 6.4   |
| 11         | .586                                       | .680                                                   | .476    | .204    | 86.7                       | 90.4                                                     | 79.8 | 10.6  |
|            |                                            |                                                        |         |         |                            |                                                          |      |       |
| Noon.      | .571                                       | .662                                                   | .461    | .201    | 87.3                       | 91.4                                                     | 79.2 | 12.2  |
| 1          | .550                                       | .643                                                   | .431    | .212    | 87.2                       | 92.0                                                     | 81.2 | 10.8  |
| 2          | .528                                       | .622                                                   | .410    | .212    | 86.7                       | 92.6                                                     | 79.8 | 12.8  |
| 3          | .512                                       | .598                                                   | .372    | .226    | 86.6                       | 93.6                                                     | 79.4 | 14.2  |
| 4          | .495                                       | .580                                                   | .364    | .216    | 86.2                       | 92.4                                                     | 78.6 | 13.8  |
| 5          | .488                                       | .582                                                   | .352    | .230    | 85.3                       | 92.8                                                     | 79.8 | 13.0  |
| 6          | .501                                       | .587                                                   | .367    | .220    | 84.4                       | 92.0                                                     | 80.1 | 11.9  |
| 7          | .520                                       | .605                                                   | .397    | .208    | 83.9                       | 89.7                                                     | 79.7 | 10.0  |
| 8          | .543                                       | .621                                                   | .413    | .208    | 83.5                       | 88.8                                                     | 79.2 | 9.6   |
| 9          | .562                                       | .647                                                   | .447    | .200    | 83.1                       | 88.3                                                     | 78.8 | 9.5   |
| 10         | .578                                       | .662                                                   | .443    | .219    | 82.8                       | 87.7                                                     | 79.0 | 8.7   |
| 11         | .579                                       | .669                                                   | .443    | .226    | 82.5                       | 86.9                                                     | 79.3 | 7.6   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 80.3                            | 1.6                 | 79.5                | 2.4                          | 0.986                            | 10.62                                            | 0.82                                                                    | 0.928                                                               |
| 1              | 80.3                            | 1.4                 | 79.6                | 2.1                          | .989                             | .65                                              | .72                                                                     | .937                                                                |
| 2              | 80.2                            | 1.3                 | 79.5                | 2.0                          | .986                             | .62                                              | .69                                                                     | .939                                                                |
| 3              | 80.1                            | 1.2                 | 79.5                | 1.8                          | .986                             | .62                                              | .62                                                                     | .945                                                                |
| 4              | 79.9                            | 1.2                 | 79.3                | 1.8                          | .979                             | .55                                              | .62                                                                     | .944                                                                |
| 5              | 79.7                            | 1.1                 | 79.1                | 1.7                          | .973                             | .49                                              | .58                                                                     | .948                                                                |
| 6              | 79.8                            | 1.1                 | 79.2                | 1.7                          | .976                             | .52                                              | .58                                                                     | .948                                                                |
| 7              | 80.3                            | 1.4                 | 79.6                | 2.1                          | .989                             | .65                                              | .72                                                                     | .937                                                                |
| 8              | 81.1                            | 1.9                 | 80.1                | 2.9                          | 1.005                            | .77                                              | 1.05                                                                    | .911                                                                |
| 9              | 81.8                            | 2.8                 | 80.4                | 4.2                          | .014                             | .85                                              | .54                                                                     | .876                                                                |
| 10             | 82.3                            | 3.5                 | 80.5                | 5.3                          | .017                             | .87                                              | .96                                                                     | .847                                                                |
| 11             | 82.6                            | 4.1                 | 80.5                | 6.2                          | .017                             | .85                                              | 2.33                                                                    | .823                                                                |
| Noon.          | 82.9                            | 4.4                 | 80.7                | 6.6                          | .024                             | .89                                              | .52                                                                     | .812                                                                |
| 1              | 82.8                            | 4.4                 | 80.6                | 6.6                          | .021                             | .86                                              | .51                                                                     | .812                                                                |
| 2              | 82.8                            | 3.9                 | 80.8                | 5.9                          | .027                             | .94                                              | .24                                                                     | .830                                                                |
| 3              | 82.4                            | 4.2                 | 80.3                | 6.3                          | .011                             | .78                                              | .36                                                                     | .820                                                                |
| 4              | 82.4                            | 3.8                 | 80.5                | 5.7                          | .017                             | .85                                              | .14                                                                     | .835                                                                |
| 5              | 81.9                            | 3.4                 | 80.2                | 5.1                          | .008                             | .77                                              | 1.87                                                                    | .852                                                                |
| 6              | 81.7                            | 2.7                 | 80.3                | 4.1                          | .011                             | .82                                              | .49                                                                     | .879                                                                |
| 7              | 81.4                            | 2.5                 | 80.1                | 3.8                          | .005                             | .75                                              | .38                                                                     | .886                                                                |
| 8              | 81.0                            | 2.5                 | 79.7                | 3.8                          | 0.992                            | .63                                              | .37                                                                     | .886                                                                |
| 9              | 80.9                            | 2.2                 | 79.8                | 3.3                          | .995                             | .69                                              | .17                                                                     | .901                                                                |
| 10             | 80.9                            | 1.9                 | 79.9                | 2.9                          | .998                             | .72                                              | .03                                                                     | .912                                                                |
| 11             | 80.7                            | 1.8                 | 79.8                | 2.7                          | .995                             | .69                                              | 0.95                                                                    | .918                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Solar radiation, Weather, &c.

| Date. | Max Solar radiation. | Rain. | Prevailing direction of the Wind.       | General aspect of the Sky.                                                                 |
|-------|----------------------|-------|-----------------------------------------|--------------------------------------------------------------------------------------------|
|       | o                    | Inc.  |                                         |                                                                                            |
| 1     | ..                   | ..    | S. sharp in the morn.                   | Cloudy with flashes of lightning in the morning.                                           |
| 2     | Sunday.              | 0.92  | ....                                    |                                                                                            |
| 3     | 142.0                | ..    | S. or S. E. or E.                       | Cloudless between 2 and 6 A. M. and cloudy the rest of the day, also drizzling at 5 P. M.  |
| 4     | ..                   | 0.10  | S. E. or E.                             | Cloudless till 4 A. M. cloudy afterwards with occasional raining.                          |
| 5     | 135.0                | ..    | E. (high) or S. E. or S.                | Cloudy.                                                                                    |
| 6     | 136.0                | ..    | S. occasionally sharp.                  | Ditto and raining at 5 P. M.                                                               |
| 7     | 124.5                | 0.15  | S.                                      | Ditto and raining occasionally.                                                            |
| 8     | ..                   | 0.40  | S.                                      | Ditto                                                                                      |
| 9     | Sunday.              | 0.80  | ....                                    |                                                                                            |
| 10    | 114.0                | ..    | S. or S. W.                             | Cloudy.                                                                                    |
| 11    | 122.4                | ..    | S. or S. E.                             | Ditto.                                                                                     |
| 12    | 124.5                | ..    | S. E. or E.                             | Cloudy with occasional drizzling.                                                          |
| 13    | 129.0                | ..    | E. or N. E. or S.                       | Cloudy and raining at 3 P. M.                                                              |
| 14    | 117.0                | 0.94  | E. or N. or S.                          | Cloudy and raining between Noon and 3 P. M.                                                |
| 15    | 138.0                | 0.57  | S. or N. E.                             | Ditto and raining between 4 and 5 P. M.                                                    |
| 16    | Sunday.              | ..    | ....                                    |                                                                                            |
| 17    | 147.4                | ..    | S. E. or E. or N. E.                    | Cloudy.                                                                                    |
| 18    | ..                   | ..    | N. E. or E.                             | Ditto and raining between 11 A. M. and 2 P. M.                                             |
| 19    | 119.0                | 1.50  | S. E. or E.                             | Ditto and constantly raining.                                                              |
| 20    | 141.0                | ..    | E. or S. E.                             | Ditto.                                                                                     |
| 21    | 138.0                | 0.19  | E. or N. E.                             | Cloudless till 4 A. M. cloudy afterwards, also raining at 8 P. M.                          |
| 22    | 140.6                | 0.17  | S. E. or N. E. or E.                    | Cloudless till 2 A. M. cloudy afterwards, also raining at 6 P. M.                          |
| 23    | Sunday.              | 0.76  | ....                                    |                                                                                            |
| 24    | 128.0                | ..    | E.                                      | Cloudy and dirzzling at Noon.                                                              |
| 25    | 131.0                | ..    | { Calm or E. high }<br>{ after sunset } | Cloudy with occasional drizzling.                                                          |
| 26    | ..                   | 1.78  | E. high till 1 P. M.                    | Cloudy constantly drizzling or raining                                                     |
| 27    | ..                   | 0.46  | N. E. or E. or S. E.                    | Cloudy till 7 P. M. cloudless afterwards, also drizzling between 3 A. M. and 4 P. M.       |
| 28    | ..                   | 0.26  | E. N. E. or N. W.                       | Cloudless till 1 A. M. cloudy afterwards, also drizzling between 7 and 8 A. M. and 9 P. M. |
| 29    | 146.0                | ..    | Calm or W. or N. W.                     | Cloudy.                                                                                    |
| 30    | Sunday }             | 1.60  | E. or N. or S. E.                       | Cloudy, constantly raining with thunder and lightning.                                     |
| 31    | 144.3 }              |       |                                         |                                                                                            |

∩ i Cirri ∩ i cirro-strati, ∩ i cumuli, ∩ i cumulo-strati, ∩ i nimbi, — i strati, ∩ i cirro-cumuli.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of August, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.083     | 92.0         | 91.8    | 81.9      | ..                   | ..       | S. E.                  | ✓ scattered        |
| 2     | 29.089     | 89.0         | 88.9    | 81.5      | ..                   | ..       | S. W.                  | Ditto              |
| 3     | 29.113     | 89.8         | 90.5    | 81.5      | ..                   | ..       | S. E.                  | ✓ Ditto            |
| 4     | 29.107     | 87.8         | 87.5    | 82.8      | ..                   | ..       | E.                     | ✓ all over         |
| 5     | 29.125     | 86.0         | 86.5    | 82.9      | ..                   | ..       | S. W.                  | Ditto              |
| 6     | 29.137     | 87.0         | 87.3    | 83.0      | ..                   | ..       | S. E.                  | ✓ scattered        |
| 7     | 29.099     | 85.0         | 85.5    | 82.4      | ..                   | ..       | N.                     | ✓ all over         |
| 8     | 29.079     | 84.0         | 83.9    | 80.0      | ..                   | ..       | W.                     | Ditto              |
| 9     | 29.087     | 84.5         | 84.5    | 79.0      | ..                   | ..       | W.                     | Ditto              |
| 10    | 29.111     | 85.0         | 85.4    | 80.0      | ..                   | ..       | N. W.                  | Ditto              |
| 11    | 29.109     | 85.1         | 84.9    | 78.6      | ..                   | ..       | N. W.                  | Ditto              |
| 12    | 29.091     | 82.0         | 82.2    | 78.3      | ..                   | ..       | N. W.                  | Ditto              |
| 13    | 29.105     | 81.0         | 81.2    | 80.0      | ..                   | ..       | W.                     | ✓ to E.            |
| 14    | 29.131     | 79.5         | 79.5    | 79.0      | ..                   | ..       | N. W.                  | ✓ all over         |
| 15    | 29.181     | 85.5         | 85.7    | 81.8      | ..                   | ..       | N. W.                  | Ditto              |
| 16    | 29.203     | 81.0         | 80.7    | 79.0      | ..                   | ..       | S. E.                  | Ditto              |
| 17    | 29.243     | 84.9         | 84.9    | 79.9      | ..                   | ..       | N. W.                  | Hazy               |
| 18    | 29.267     | 80.0         | 79.5    | 78.4      | ..                   | ..       | S. W.                  | ✓ all over         |
| 19    | 29.233     | 84.7         | 85.0    | 80.1      | ..                   | ..       | W.                     | ✓ scattered        |
| 20    | 29.225     | 84.0         | 84.6    | 80.0      | ..                   | ..       | W.                     | Ditto              |
| 21    | 29.247     | 83.5         | 83.8    | 80.5      | ..                   | ..       | N. W.                  | ✓ all over         |
| 22    | 29.219     | 84.8         | 84.6    | 79.5      | ..                   | ..       | W.                     | Ditto              |
| 23    | 29.149     | 84.0         | 84.1    | 79.1      | ..                   | ..       | W.                     | Ditto              |
| 24    | 29.195     | 83.7         | 83.7    | 78.5      | ..                   | ..       | S. W.                  | Ditto              |
| 25    | 29.193     | 85.0         | 85.2    | 79.9      | ..                   | ..       | W.                     | ✓ scattered        |
| 26    | 29.283     | 87.0         | 87.8    | 79.4      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| 27    | 29.285     | 88.0         | 88.3    | 79.0      | ..                   | ..       | N.                     | Clear              |
| 28    | 29.255     | 89.5         | 90.1    | 78.0      | ..                   | ..       | W.                     | Ditto              |
| 29    | 29.267     | 90.0         | 90.5    | 78.5      | ..                   | ..       | N.                     | Ditto              |
| 30    | 29.233     | 90.5         | 91.5    | 76.6      | ..                   | ..       | N. W.                  | Ditto              |
| 31    | 29.223     | 92.1         | 92.8    | 72.5      | ..                   | ..       | N. W.                  | Ditto              |
| Mean. | 29.173     | 85.7         | 85.8    | 79.7      | ..                   | ..       | ..                     | ....               |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of August, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.  |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|---------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                     |
| 1     | 29.051     | 94.2         | 94.3    | 82.0      | ..                   | ..       | S.                     | ☼ scattered         |
| 2     | 29.055     | 90.7         | 91.0    | 82.9      | ..                   | ..       | S. W.                  | Ditto               |
| 3     | 29.071     | 92.5         | 93.5    | 82.0      | ..                   | ..       | S. E.                  | Ditto               |
| 4     | 29.089     | 89.0         | 89.1    | 82.5      | ..                   | ..       | E.                     | Ditto               |
| 5     | 29.101     | 89.0         | 89.1    | 82.5      | ..                   | ..       | E.                     | Ditto               |
| 6     | 29.109     | 84.0         | 84.2    | 82.0      | ..                   | ..       | N. E.                  | Ditto               |
| 7     | 29.067     | 83.2         | 82.3    | 80.4      | ..                   | ..       | W.                     | ☼ all over          |
| 8     | 29.051     | 85.5         | 85.8    | 81.5      | ..                   | ..       | W.                     | ☼ scattered         |
| 9     | 29.055     | 86.5         | 87.0    | 80.5      | ..                   | ..       | W.                     | Ditto               |
| 10    | 29.089     | 87.5         | 88.0    | 80.5      | ..                   | ..       | N. W.                  | ☼ all over          |
| 11    | 29.089     | 85.8         | 85.5    | 79.1      | ..                   | ..       | N. W.                  | Ditto               |
| 12    | 29.069     | 81.0         | 81.0    | 79.3      | ..                   | ..       | N. W.                  | Ditto               |
| 13    | 29.079     | 82.2         | 82.3    | 79.0      | ..                   | ..       | N. W.                  | Ditto               |
| 14    | 29.125     | 81.5         | 82.0    | 80.1      | ..                   | ..       | N. W.                  | Ditto               |
| 15    | 29.167     | 86.3         | 86.0    | 80.5      | ..                   | ..       | N. W.                  | ☼ scattered         |
| 16    | 29.187     | 82.0         | 81.8    | 79.4      | ..                   | ..       | S. E.                  | ☼ all over          |
| 17    | 29.227     | 85.9         | 85.4    | 80.0      | ..                   | ..       | N. W.                  | Ditto               |
| 18    | 29.241     | 80.9         | 81.0    | 78.6      | ..                   | ..       | W.                     | Ditto               |
| 19    | 29.225     | 86.9         | 87.2    | 80.7      | ..                   | ..       | W.                     | ☼ scattered         |
| 20    | 29.219     | 86.2         | 86.7    | 80.3      | ..                   | ..       | W.                     | Ditto               |
| 21    | 29.219     | 84.5         | 84.2    | 81.6      | ..                   | ..       | N. W.                  | ☼ all over          |
| 22    | 29.203     | 86.7         | 86.7    | 81.2      | ..                   | ..       | W.                     | ☼ scattered         |
| 23    | 29.149     | 86.0         | 86.2    | 79.5      | ..                   | ..       | W.                     | Hazy                |
| 24    | 29.173     | 85.3         | 85.5    | 78.4      | ..                   | ..       | S. W.                  | ☼ all over          |
| 25    | 29.179     | 87.0         | 87.6    | 78.6      | ..                   | ..       | W.                     | ☼ scattered in hor. |
| 26    | 29.283     | 89.5         | 90.4    | 79.5      | ..                   | ..       | N. W.                  | ☼ Do. towards do.   |
| 27    | 29.275     | 89.5         | 89.9    | 79.7      | ..                   | ..       | N. W.                  | ☼ scattered         |
| 28    | 29.243     | 92.5         | 93.4    | 79.1      | ..                   | ..       | W.                     | Clear               |
| 29    | 29.235     | 93.2         | 93.5    | 79.6      | ..                   | ..       | N.                     | Ditto               |
| 30    | 29.215     | 95.5         | 96.5    | 80.0      | ..                   | ..       | N. W.                  | Ditto               |
| 31    | 29.205     | 95.2         | 96.4    | 76.5      | ..                   | ..       | N. W.                  | Ditto               |
| Mean. | 29.135     | 87.2         | 81.7    | 80.2      | ..                   | ..       | ..                     | ....                |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of August, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauge.                  |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.001     | 88.0         | 86.6    | 80.5      | 91.5                 | 82.3     | 86.9  | ✓ scattered        | 0.112                        | S. W.                  |
| 2     | 29.011     | 90.0         | 87.4    | 82.9      | 90.0                 | 83.5     | 86.75 | ✓ all over         | ..                           | S. E.                  |
| 3     | 29.005     | 86.5         | 84.3    | 81.6      | 92.0                 | 82.0     | 87.0  | Ditto              | 0.982                        | S. E.                  |
| 4     | 29.023     | 92.0         | 91.0    | 82.5      | 91.0                 | 81.5     | 86.25 | ✓ scattered        | 0.502                        | E.                     |
| 5     | 29.055     | 88.5         | 87.6    | 84.0      | 88.5                 | 84.0     | 86.25 | ✓ all over         | 0.102                        | S. E.                  |
| 6     | 29.031     | 83.3         | 83.3    | 80.5      | 83.0                 | 82.5     | 82.75 | Ditto              | 1.602                        | N.                     |
| 7     | 29.033     | 81.0         | 79.8    | 78.8      | 84.5                 | 81.0     | 82.75 | Ditto              | 1.102                        | W.                     |
| 8     | 28.973     | 82.2         | 81.6    | 80.0      | 85.6                 | 80.0     | 82.8  | Ditto              | 0.704                        | W.                     |
| 9     | 29.007     | 90.4         | 89.7    | 80.3      | 89.5                 | 80.0     | 84.75 | ✓ scattered        | ..                           | W.                     |
| 10    | 29.025     | 89.5         | 88.9    | 82.2      | 89.0                 | 81.0     | ..    | ✓ all over         | ..                           | N.W.                   |
| 11    | 29.015     | 85.7         | 83.8    | 81.3      | 85.2                 | 81.7     | 83.45 | Ditto              | ..                           | N.W.                   |
| 12    | 29.031     | 83.9         | 83.9    | 81.2      | 83.4                 | 79.5     | 81.45 | Ditto              | 0.954                        | N.W.                   |
| 13    | 29.047     | 85.0         | 84.9    | 81.0      | 84.6                 | 79.5     | 82.05 | Ditto              | 0.222                        | N.W.                   |
| 14    | 29.083     | 84.0         | 83.9    | 81.0      | 83.7                 | 77.5     | 80.6  | Ditto              | ..                           | N.W.                   |
| 15    | 29.109     | 87.9         | 87.2    | 82.5      | 87.0                 | 80.9     | 83.95 | Ditto              | ..                           | N.W.                   |
| 16    | 29.143     | 85.7         | 85.0    | 80.9      | 85.0                 | 81.0     | 83.0  | ✓ scattered        | 0.205                        | N. E.                  |
| 17    | 29.163     | 89.5         | 82.2    | 82.5      | 88.0                 | 79.5     | 83.75 | Ditto              | ..                           | N.W.                   |
| 18    | 29.159     | 84.5         | 83.9    | 80.0      | 84.0                 | 79.0     | 81.5  | Ditto              | 0.152                        | W.                     |
| 19    | 29.131     | 89.5         | 89.0    | 81.4      | 89.0                 | 78.8     | 83.9  | ✓ all over         | 0.772                        | W.                     |
| 20    | 29.111     | 88.3         | 89.0    | 81.0      | 89.5                 | 80.0     | 84.75 | ✓ scattered        | ..                           | N.W.                   |
| 21    | 29.163     | 85.3         | 83.5    | 81.2      | 83.4                 | 80.0     | 81.7  | ✓ all over         | ..                           | N.W.                   |
| 22    | 29.119     | 88.9         | 88.2    | 83.0      | 88.6                 | 81.5     | 85.05 | Ditto              | ..                           | W.                     |
| 23    | 29.105     | 87.5         | 87.0    | 81.0      | 87.0                 | 81.5     | 84.25 | Ditto              | ..                           | W.                     |
| 24    | 29.089     | 86.8         | 86.0    | 80.8      | 85.8                 | 80.5     | 83.15 | Ditto              | ..                           | N.W.                   |
| 25    | 29.123     | 91.9         | 91.4    | 80.4      | 91.0                 | 81.0     | 86.0  | ✓ scattered        | ..                           | W.                     |
| 26    | 29.199     | 93.5         | 93.5    | 80.8      | 93.5                 | 80.8     | 87.15 | ✓ Ditto            | ..                           | N.W.                   |
| 27    | 29.203     | 94.9         | 95.2    | 80.5      | 95.0                 | 81.0     | 88.0  | ..                 | ..                           | N.                     |
| 28    | 29.155     | 96.0         | 95.5    | 79.6      | 95.0                 | 80.8     | 87.9  | ✓ scattered        | ..                           | N.                     |
| 29    | 29.131     | 97.0         | 96.7    | 80.0      | 97.6                 | 81.4     | 89.5  | Ditto              | ..                           | N.                     |
| 30    | 29.141     | 99.4         | 98.0    | 80.4      | 97.5                 | 81.5     | 89.5  | Clear              | ..                           | N.W.                   |
| 31    | 29.123     | 99.9         | 99.5    | 79.0      | 99.0                 | 82.0     | 90.5  | Ditto              | ..                           | N.W.                   |
| Mn.   | 29.087     | 88.9         | 88.1    | 81.0      | 88.9                 | 80.8     | 84.91 | ..                 | 7.411                        | ..                     |

*Meteorological Remarks and Tables commencing 1st May, 1854, at  
the Residency, Lucknow.*

Site of observations. The Residency Surgeon's house.

The instruments, arranged in a northern verandah about 25 feet in breadth and raised 5 feet from the ground, are as follow :

Aneroid Barometer No. 10165 compared with the Newman's Standard No. 86, in the Surveyor General's Office, in Calcutta.

The instrument is suspended against the wall facing to the north and at the height of the level of the eye from the ground. It is perfectly sheltered and protected from accident or violence as from the direct or reflected rays of the sun. Attached to the Barometer is a small spirit thermometer.

2.—A wet and dry bulb thermometer by Newman ; placed near the Barometer.

3.—A simple mercurial thermometer.

4.—A pluviometer of simple construction.

The site is not very favorable for Meteorological Observations, being almost in the centre of the city, and consequently deprived to a certain extent of free circulation of pure air ; and being surrounded on all sides by buildings and small trees, the actual force and direction of the wind are often difficult to ascertain ; the condition of the atmosphere and the aspect of the sky are affected by the smoke and exhalations from the city.

J. FAYRER, M. D., F. R. G. S.

| Date.  | Ar 6 A. M.   |           |                              |                 | Ar 9 A. M.   |           |                              |                | Noon.        |           |                              |                |
|--------|--------------|-----------|------------------------------|-----------------|--------------|-----------|------------------------------|----------------|--------------|-----------|------------------------------|----------------|
|        | Thermometer. |           | Force and direction of Wind. | Aspect of Sky.  | Thermometer. |           | Force and direction of Wind. | Aspect of Sky. | Thermometer. |           | Force and direction of Wind. | Aspect of Sky. |
|        | Wet Bulb.    | Dry Bulb. |                              |                 | Wet Bulb.    | Dry Bulb. |                              |                | Wet Bulb.    | Dry Bulb. |                              |                |
| 1      | 66           | 80        | Calm.                        | Clear.          | 67           | 88        | Calm.                        | Clear.         | 68           | 96        | Calm.                        | Clear.         |
| 2      | 72           | 84        | Ditto.                       | Hazy            | *            | *         |                              |                | 75           | 91        | S. E. lt.                    | Hazy.          |
| 3      | *            |           |                              |                 | 74           | 87        |                              |                | *            |           |                              |                |
| 4      | 70           | 84        | E N. E.                      | Thunderculo-st. | 72           | 86        | Fr. S. E.                    | Hazy.          | 72           | 86        | E. fresh.                    | Cumuli.        |
| 5      | 69           | 78        | East lt.                     | Curo-st. hazy.  | 72           | 84        | Fr. E. N. E.                 | Ciri.          | 73           | 88        | Ditto.                       | Ditto.         |
| 6      | 72           | 81        | N. E. lt.                    | Curo-strati.    | 72           | 83        | S. E. fr.                    | Curo-st.       | 78           | 87        | S. E. stdy.                  | Curo-cum.      |
| 7      | 72           | 82        | E. light.                    | Ciri-strati.    | 75           | 86        | S. E. lt.                    | Ciri.          | 74           | 90        | Ditto lt.                    | Cumuli.        |
| 8      | 69           | 79        | Lt. Calm.                    | Clear.          | 73           | 83        | S. E. stdy.                  | Curo-cum.      | 72           | 87        | N. W. lt.                    | Ciri.          |
| 9      | 72           | 83        | N. W.                        | Cumuli.         | **           | **        | Calm.                        | Ciri.          | 73           | 91        | Ditto.                       | Ditto.         |
| 10     | 68           | 81        | Calm.                        | Clear.          | *            | *         | **                           | **             | 68           | 89        | S. W. lt.                    | Ditto.         |
| 11     | 67           | 84        | Ditto.                       | Ditto.          | 69           | 89        | S. W. lt.                    | Clear.         | 69           | 92        | S. W. fr.                    | Ditto.         |
| 12     | 67           | 83        | Ditto.                       | Ditto.          | 68           | 91        | Ditto.                       | Ciri.          | 71           | 94        | Ditto.                       | Clear.         |
| 13     | 69           | 85        | Ditto.                       | Ditto.          | 71           | 90        | N. W. lt.                    | Ditto.         | **           | **        | **                           | **             |
| 14     | 73           | 89        | Ditto.                       | Ciri.           | **           | **        |                              |                | *            | *         |                              |                |
| 15     | *            |           |                              |                 | 74           | 93        | **                           | **             | 74           | 98        | Calm.                        | Curo.          |
| 16     | 78           | 88        | **                           | ....            | **           | **        | Calm.                        | Clear.         | 74           | 94        | S. W. lt.                    | Ciri-cum.      |
| 17     | 71           | 88        | Calm.                        | Hazy.           | **           | **        | **                           | **             | 74           | 94        | Ditto.                       | Hazy.          |
| 18     | 72           | 88        | Ditto.                       | Ditto.          | *            | *         | **                           | **             | 74           | 94        | Ditto.                       | Ditto.         |
| 19     | 71           | 85        | Ditto.                       | Clear.          | 74           | 93        | Lt. S. W.                    | Clear.         | 77           | 95        | Ditto.                       | Ditto.         |
| 20     | 67           | 87        | Ditto.                       | Ditto.          | 70           | 93        | S. W. lt.                    | Ditto.         | 73           | 98        | West lt.                     | Ditto.         |
| 21     | 65           | 87        | Ditto.                       | Ditto.          | **           | **        | **                           | **             | 71           | 96        | S. W. lt.                    | Clear.         |
| 22     | 69           | 87        | Ditto.                       | Ditto.          | *            | *         | **                           | **             | 73           | 97        | Calm.                        | Ditto.         |
| 23     | 70           | 86        | Ditto.                       | Ditto.          | 75           | 93        | S. W. lt.                    | Clear.         | 73           | 99        | Ditto.                       | Ditto.         |
| 24     | 72           | 87        | Ditto.                       | Ditto.          | *            | *         | **                           | **             | 76           | 100       | Ditto.                       | Ditto.         |
| 25     | 70           | 88        | Ditto.                       | Ditto.          | 72           | 94        | S. W. lt.                    | Clear.         | 74           | 102       | Ditto.                       | Ditto.         |
| 26     | 73           | 89        | South lt.                    | Ditto.          | 80           | 95        | S. E. lt.                    | Clear.         | 72           | 104       | Ditto.                       | Ditto.         |
| 27     | 79           | 92        | S. E. lt.                    | Ditto.          | 81           | 95        | Ditto.                       | Ditto.         | 78           | 101       | S. E. lt.                    | Ditto.         |
| 28     | 79           | 93        | Calm.                        | Hazy in East.   | 80           | 95        | S. E. fr.                    | Hazy in E.     | 80           | 99        | Ditto.                       | Ditto.         |
| 29     | 79           | 91        | Ditto.                       | Ditto.          | *            | *         |                              |                | *            | *         |                              |                |
| 30     | 78           | 91        | S. E. lt.                    | Ditto.          | 79           | 92        | S. E. fr.                    | Hazy.          | 81           | 100       | S. E. lt.                    | Ditto.         |
| 31     | 79           | 91        | Ditto.                       | Clear.          | 81           | 94        | Ditto.                       | Clear.         | *            | 96        | N. E. lt.                    | Ditto.         |
| Total. | 2078         | 2491      | **                           | ....            | 1,478        | 1,804     | **                           | **             | 1,924        | 2464      | **                           | **             |
| Averg. | 71.655       | 85.896    | **                           | ....            | 739          | 902       | **                           | **             | 74           | 94.769    | **                           | **             |

\* No observation.



*Meteorological Observations kept at the Residency, Lucknow, for the Month of May, 1854.*

| AT 3 P. M.   |           |                              |                |               | AT 6 P. M.   |           |                              |                |            | AT 9 P. M.   |           |                              |                |                    |                                    |
|--------------|-----------|------------------------------|----------------|---------------|--------------|-----------|------------------------------|----------------|------------|--------------|-----------|------------------------------|----------------|--------------------|------------------------------------|
| Thermometer. |           | Force and direction of Wind. | Aspect of Sky. | Barometer.    | Thermometer. |           | Force and direction of Wind. | Aspect of Sky. | Barometer. | Thermometer. |           | Force and direction of Wind. | Aspect of Sky. | Rain Gauge Inchee. | Remarks.                           |
| Wet Bulb.    | Dry Bulb. |                              |                |               | Wet Bulb.    | Dry Bulb. |                              |                |            | Wet Bulb.    | Dry Bulb. |                              |                |                    |                                    |
| *            | 73        | 29.45                        | S. E. lt.      | Hazy.         | 68           | 95        | S. W. lt.                    | Hazy.          | 29.42      | **           | **        | **                           | **             | **                 | Dust storm at 3 P. M.              |
| *            | 72        | 29.50                        | E. fresh.      | Hazy.         | 74           | 93        | S. E. lt.                    | Clear.         | 29.47      | *            | *         | **                           | **             | **                 | Fresh breeze—S. E. all day.        |
| *            | 74        | 29.48                        | Ditto.         | Ditto.        | 71           | 85        | Lt. S. E.                    | Hazy.          | 29.50      | 73           | 83        | S. E. lt.                    | Clear.         | **                 | Light rain last night.             |
| *            | 73        | 29.46                        | N. W. fr.      | { Dust storm, | 74           | 87        | Lt. E.                       | Clear.         | 29.44      | *            | *         | Ditto.                       | Ciri.          | **                 | [day, light air at sunset.         |
|              | 73        | 29.49                        | N. W. lt.      | Ciri.         | 73           | 89        | Ditto.                       | Ditto.         | 29.48      | 73           | 87        | Ditto.                       | Ditto.         | **                 | Fr. breeze during the              |
|              | 68        | 29.48                        | N. W. fr.      | Curo-st.      | 71           | 85        | Lt. N. E.                    | Cumuli.        | 29.44      | 77           | 83        | Ditto.                       | Ditto.         | **                 | Dust storm at 2 P. M.              |
| *            | 69        | 29.48                        | Ditto.         | Ditto.        | *            | *         | **                           | **             | **         | *            | *         | **                           | **             | **                 | Light shower rain in evening.      |
| *            | 74        | 29.56                        | Calm.          | C.-cum.       | 72           | 96        | Calm.                        | Clear.         | 29.48      | *            | *         | **                           | **             | **                 | Shower at 2 P. M. none registered. |
| 74           | 99        | 29.55                        | Lt. S. W.      | Ditto.        | 73           | 92        | Ditto.                       | Ditto.         | 29.47      | *            | *         | **                           | **             | **                 | Dust storm at 6 P. M.              |
| 73           | 96        | 29.57                        | Ditto.         | Hazy.         | 74           | 94        | Fresh.                       | V. storm.      | 29.55      | *            | *         | **                           | **             | **                 | very vt. drops of rn.              |
| 74           | 96        | 29.57                        | Ditto.         | Cumuli.       | 72           | 95        | Lt. S. W.                    | Ciri.          | 29.47      | *            | *         | **                           | **             | **                 | Dust storm in the nt.              |
| 75           | 96        | 29.62                        | Ditto.         | Cumuli.       | 73           | 95        | S. W. lt.                    | Hazy.          | 29.53      | *            | *         | **                           | **             | **                 | Weather intensely hot.             |
| *            | 70        | 29.50                        | S. W. lt.      | Ciri.         | 73           | 97        | Ditto.                       | C.-cum.        | 29.60      | *            | *         | **                           | **             | **                 | Ditto. [until sunset.              |
| 72           | 91        | 29.47                        | Calm.          | Clear.        | 72           | 97        | Calm.                        | Hazy.          | 29.50      | *            | *         | **                           | **             | **                 | Intensely hot wind                 |
| 73           | 101       | 29.43                        | N. W. fr.      | Ditto.        | 70           | 97        | Ditto.                       | Ditto.         | 29.47      | *            | *         | **                           | **             | **                 | Ditto.                             |
| 78           | 101       | 29.40                        | Ditto.         | Ditto.        | 72           | 101       | Ditto.                       | Ditto.         | 29.38      | *            | *         | **                           | **             | **                 | Ditto. [113.                       |
| 73           | 103       | 29.38                        | Ditto.         | Ditto.        | 72           | 102       | Ditto.                       | Ditto.         | 29.34      | *            | *         | **                           | **             | **                 | Temp. in shade at noon             |
| *            | 73        | 29.28                        | S. lt.         | Clear.        | 73           | 102       | Ditto.                       | Clear.         | 29.27      | *            | *         | **                           | **             | **                 | Temp. in shade at noon             |
| 76           | 104       | 29.27                        | S. W. lt.      | Ditto.        | 72           | 103       | N. W. fr.                    | Hazy.          | 29.27      | *            | *         | **                           | **             | **                 | Temp. in hot wind 112.             |
| 79           | 103       | 29.26                        | Ditto.         | Ditto.        | 74           | 103       | S. W. lt.                    | Clear.         | 29.27      | *            | *         | **                           | **             | **                 | Cr. wr. S. E. wind at n.           |
| 81           | 102       | 29.28                        | S. E. lt.      | Ditto.        | 77           | 103       | Ditto.                       | Ditto.         | 29.23      | *            | *         | **                           | **             | **                 | Wind changed about                 |
| 79           | 102       | 29.32                        | Ditto.         | Ditto.        | 78           | 103       | Ditto.                       | Ditto.         | 29.25      | *            | *         | **                           | **             | **                 | 2 to 3 P. M.                       |
| 79           | 102       | 29.32                        | Ditto.         | Ditto.        | 81           | 97        | S. E. stdy.                  | Hazy.          | 29.25      | *            | *         | **                           | **             | **                 |                                    |
| 81           | 100       | 29.32                        | Ditto.         | Ditto.        | 79           | 100       | S. E. lt.                    | Curo.          | 29.28      | *            | *         | **                           | **             | **                 |                                    |
|              |           |                              |                |               | 79           | 100       | S. E. lt.                    | Curo.          | 29.28      | *            | *         | **                           | **             | **                 |                                    |
|              |           |                              |                |               | 81           | 101       | Ditto.                       | Ditto.         | 29.30      | *            | *         | **                           | **             | **                 |                                    |
| 1.633        | 2.130     | 64.755                       | **             | **            | 1.760        | 2.398     | **                           | **             | 73.538     | 223          | 253       | **                           | **             | **                 | Strong S. E. wind last night.      |
| 74.227       | 96.819    | 29.434                       | **             | **            | 73.333       | 9.592     | **                           | **             | 29.415     | 74.333       | 84.333    | **                           | **             | **                 | [night.                            |
|              |           |                              |                |               |              |           |                              |                |            |              |           |                              |                |                    | Strong S. E. wind last             |
|              |           |                              |                |               |              |           |                              |                |            |              |           |                              |                |                    | .....                              |
|              |           |                              |                |               |              |           |                              |                |            |              |           |                              |                |                    | .....                              |

\* No observation.

*Abstract of the Meteorological Register for May, 1854.*

*Lucknow, 1st June, 1854.*

*Meteorological Register kept at Lucknow.*

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| Thermometer<br>6 A. M. |          |       | Thermometer<br>9 A. M. |          |       | Thermometer<br>Noon. |          |        | Thermometer<br>3 P. M. |          |        | Thermometer<br>6 P. M. |          |       | Thermometer<br>9 P. M. |          |       | Remarks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------|----------|-------|------------------------|----------|-------|----------------------|----------|--------|------------------------|----------|--------|------------------------|----------|-------|------------------------|----------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum.               | Minimum. | Mid.  | Maximum.               | Minimum. | Mid.  | Maximum.             | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.  | Maximum.               | Minimum. | Mid.  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Wet...                 | 79       | 65    | 71.655                 | 81       | 67    | 73.9                 | 81       | 68     | 74.227                 | 81       | 68     | 73.333                 | 77       | 73    | 74.333                 |          |       | The weather this month very hot and dry.<br>During the early part of it South West wind prevailed; during the latter part variable frequently from the East and South East.<br>Dust Storms frequent, one of great violence on the 15th. Light showers of rain attended by thunder and lightning have fallen occasionally, but the quantity was not appreciable in the pluviometer.<br>Towards the latter part of the month the Eastern horizon clouded and frequent lightning in the same quarter. Temperature of the hot wind in the shade by frequent observations 112-110. At the same time behind the Tuttee the Thermometer stood at 85-87-90. |
| Dry...                 | 93       | 78    | 85.896                 | 95       | 83    | 90.2                 | 10.486   | 94.769 | 10.586                 | 96.819   | 10.385 | 95.92                  | 87       | 83    | 84.333                 |          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Barometer<br>6 A. M.   |          |       | Barometer<br>9 A. M.   |          |       | Barometer<br>Noon.   |          |        | Barometer<br>3 P. M.   |          |        | Barometer<br>6 P. M.   |          |       | Barometer<br>9 P. M.   |          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Maximum.               | Minimum. | Mid.  | Maximum.               | Minimum. | Mid.  | Maximum.             | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.  | Maximum.               | Minimum. | Mid.  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                        | 29.57    | 29.20 | 29.455                 | 29.62    | 29.28 | 29.462               | 29.68    | 29.30  | 29.501                 | 29.62    | 29.26  | 29.434                 | 29.60    | 29.23 | 29.415                 | 29.56    | 29.53 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

Of 29 Observations.      Of 20 Observations.      Of 26 Observations.      Of 22 Observations.      Of 25 Observations.      Of 3 Observations.

J. F.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.217     | 93.5         | 93.8    | 81.4      | ..                   | ..       | N.                     | Clear                |
| 2     | 29.233     | 93.5         | 92.5    | 83.4      | ..                   | ..       | N. E.                  | ~ scattered          |
| 3     | 29.273     | 91.6         | 91.0    | 80.9      | ..                   | ..       | ..                     | ....                 |
| 4     | 29.225     | 86.7         | 87.3    | 82.5      | ..                   | ..       | ..                     | ~ scattered          |
| 5     | 29.199     | 87.0         | 87.0    | 82.5      | ..                   | ..       | N. E.                  | Ditto                |
| 6     | 29.183     | 85.6         | 86.0    | 82.4      | ..                   | ..       | N.                     | ~ all over           |
| 7     | 29.171     | 86.6         | 86.3    | 81.5      | ..                   | ..       | N. E.                  | ~ scattered all over |
| 8     | 29.145     | 82.7         | 83.1    | 80.5      | ..                   | ..       | N. E.                  | ~ all over           |
| 9     | 29.157     | 84.0         | 84.7    | 80.7      | ..                   | ..       | N.                     | Ditto                |
| 10    | 29.211     | 86.0         | 86.5    | 81.0      | ..                   | ..       | N. W.                  | Ditto                |
| 11    | 29.229     | 88.5         | 89.5    | 82.0      | ..                   | ..       | E.                     | ~ scattered          |
| 12    | 29.161     | 89.7         | 90.3    | 80.4      | ..                   | ..       | N. E.                  | ~ Ditto              |
| 13    | 29.023     | 85.0         | 84.6    | 79.5      | ..                   | ..       | N. W.                  | ~ all over           |
| 14    | 29.207     | 85.6         | 85.0    | 78.0      | ..                   | ..       | ..                     | Ditto                |
| 15    | 29.205     | 85.0         | 84.6    | 79.2      | ..                   | ..       | ..                     | Ditto                |
| 16    | 29.241     | 84.7         | 84.4    | 80.0      | ..                   | ..       | N. W.                  | Clear                |
| 17    | 29.251     | 84.0         | 83.6    | 80.0      | ..                   | ..       | ..                     | ~ all over           |
| 18    | 29.295     | 84.5         | 85.2    | 79.8      | ..                   | ..       | N. W.                  | ~ scattered          |
| 19    | 29.327     | 85.1         | 85.2    | 80.0      | ..                   | ..       | N. W.                  | Clear                |
| 20    | 29.345     | 85.0         | 85.4    | 78.0      | ..                   | ..       | N. W.                  | ~ scattered          |
| 21    | 29.389     | 85.5         | 86.2    | 77.0      | ..                   | ..       | N. W.                  | Clear                |
| 22    | 29.397     | 86.2         | 86.2    | 77.0      | ..                   | ..       | N. W.                  | ~ scattered          |
| 23    | 29.367     | 87.8         | 88.0    | 79.4      | ..                   | ..       | N.                     | Ditto                |
| 24    | 29.375     | 88.5         | 88.7    | 79.0      | ..                   | ..       | N. W.                  | ~ Ditto              |
| 25    | 29.409     | 89.0         | 90.0    | 80.5      | ..                   | ..       | N. E.                  | ~ Ditto              |
| 26    | 29.405     | 88.4         | 89.0    | 80.0      | ..                   | ..       | N.                     | ~ Ditto              |
| 27    | 29.373     | 80.0         | 80.0    | 75.0      | ..                   | ..       | E.                     | ~ Ditto              |
| 28    | 29.429     | 77.5         | 77.7    | 73.5      | ..                   | ..       | N. E.                  | ~ Ditto all over     |
| 29    | 29.393     | 78.3         | 78.5    | 74.5      | ..                   | ..       | N. W.                  | ~ Ditto              |
| 30    | 29.369     | 82.7         | 83.5    | 74.0      | ..                   | ..       | N. W.                  | ~ Ditto              |
| Mean. | 29.273     | 85.9         | 86.1    | 80.1      | ..                   | ..       | ..                     | ....                 |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.193     | 95.7         | 96.4    | 79.5      | ..                   | ..       | N.                     | Clear              |
| 2     | 29.205     | 95.0         | 95.0    | 82.5      | ..                   | ..       | N. E.                  | ✓ scattered        |
| 3     | 29.239     | 89.0         | 87.2    | 81.5      | ..                   | ..       | S. E.                  | ✓ Ditto            |
| 4     | 29.193     | 89.0         | 89.5    | 82.8      | ..                   | ..       | S. E.                  | Ditto towards hor. |
| 5     | 29.163     | 88.8         | 89.0    | 82.5      | ..                   | ..       | N. E.                  | ✓ scattered        |
| 6     | 29.151     | 87.0         | 87.8    | 82.4      | ..                   | ..       | N.                     | ✓ Ditto            |
| 7     | 29.147     | 85.8         | 79.9    | 79.5      | ..                   | ..       | N. E.                  | ✓ raining          |
| 8     | 29.119     | 84.5         | 84.9    | 80.6      | ..                   | ..       | N. E.                  | ✓ all over         |
| 9     | 29.131     | 86.7         | 87.0    | 81.2      | ..                   | ..       | N.                     | Ditto              |
| 10    | 29.193     | 88.2         | 88.7    | 81.5      | ..                   | ..       | N.                     | Ditto              |
| 11    | 29.207     | 89.9         | 90.4    | 81.5      | ..                   | ..       | E.                     | ✓ scattered        |
| 12    | 29.135     | 90.7         | 91.0    | 80.5      | ..                   | ..       | N. E.                  | ✓ Ditto            |
| 13    | 28.999     | 81.5         | 79.4    | 76.0      | ..                   | ..       | N. W.                  | ✓ all over         |
| 14    | 29.193     | 87.2         | 86.6    | 78.5      | ..                   | ..       | ..                     | Ditto              |
| 15    | 29.201     | 85.9         | 85.6    | 80.0      | ..                   | ..       | ..                     | Ditto              |
| 16    | 29.207     | 86.5         | 86.4    | 79.5      | ..                   | ..       | N. W.                  | ✓ towards W.       |
| 17    | 29.213     | 84.9         | 84.4    | 80.2      | ..                   | ..       | W.                     | ✓ all over         |
| 18    | 29.277     | 86.0         | 86.4    | 79.5      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 19    | 29.309     | 86.2         | 86.2    | 80.0      | ..                   | ..       | N. W.                  | ✓ all over         |
| 20    | 29.333     | 86.8         | 87.1    | 78.8      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 21    | 29.363     | 88.5         | 89.0    | 77.5      | ..                   | ..       | N. W.                  | Ditto              |
| 22    | 29.375     | 87.8         | 87.8    | 77.7      | ..                   | ..       | N. W.                  | Ditto              |
| 23    | 29.333     | 89.1         | 89.5    | 80.0      | ..                   | ..       | N.                     | Ditto              |
| 24    | 29.329     | 91.0         | 91.4    | 80.6      | ..                   | ..       | W.                     | ✓ Ditto            |
| 25    | 29.379     | 90.7         | 91.2    | 79.2      | ..                   | ..       | N. E.                  | ✓ Ditto            |
| 26    | 29.361     | 89.0         | 89.5    | 80.0      | ..                   | ..       | N.                     | ✓ Ditto            |
| 27    | 29.365     | 81.7         | 81.9    | 76.0      | ..                   | ..       | E.                     | Ditto              |
| 28    | 29.403     | 79.0         | 79.3    | 74.5      | ..                   | ..       | N. E.                  | Ditto              |
| 29    | 29.371     | 80.7         | 81.3    | 76.0      | ..                   | ..       | N. W.                  | Ditto              |
| 30    | 29.355     | 83.8         | 84.2    | 74.5      | ..                   | ..       | N. W.                  | Ditto              |
| Mean. | 29.248     | 87.2         | 87.1    | 79.4      | ..                   | ..       | ..                     | ...                |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.       | Rain Gauge.                  |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                          | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.117     | 100.9        | 100.0   | 81.8      | 99.5                 | 82.5     | 91.0  | Clear [W.                | ..                           | N.                     |
| 2     | 29.133     | 96.9         | 94.5    | 84.0      | 94.0                 | 82.0     | 88.0  | ↘ towards                | ..                           | N. E.                  |
| 3     | 29.145     | 90.5         | 90.3    | 81.5      | 91.0                 | 81.0     | 86.0  | ↘ do. all over.          | ..                           | S. E.                  |
| 4     | 29.119     | 85.9         | 85.0    | 80.6      | 87.0                 | 78.5     | 82.75 | ↘ scattered towards hor. | 0.732                        | ..                     |
| 5     | 29.105     | 87.5         | 84.5    | 80.5      | 86.0                 | 78.0     | 82.0  | ↘ all over               | 0.102                        | N. E.                  |
| 6     | 29.065     | 88.8         | 87.5    | 80.5      | 86.6                 | 77.2     | 81.9  | Ditto                    | ..                           | E.                     |
| 7     | 28.079     | 83.0         | 82.9    | 79.5      | 83.0                 | 77.5     | 80.25 | Ditto                    | 0.442                        | ..                     |
| 8     | 29.015     | 86.5         | 85.5    | 81.4      | 85.0                 | 76.0     | 80.5  | Ditto                    | ..                           | N. E.                  |
| 9     | 29.035     | 87.9         | 88.0    | 82.0      | 88.4                 | 76.0     | 82.2  | Ditto                    | ..                           | N.                     |
| 10    | 29.103     | 90.7         | 90.4    | 82.1      | 90.0                 | 76.5     | 83.25 | Ditto                    | ..                           | N.                     |
| 11    | 29.103     | 92.8         | 92.8    | 82.4      | 92.3                 | 77.3     | 84.8  | ↘ scattered              | ..                           | E.                     |
| 12    | 29.055     | 93.0         | 92.2    | 80.0      | 93.0                 | 78.0     | 85.5  | ↘ Ditto                  | ..                           | E.                     |
| 13    | 28.931     | 81.0         | 79.8    | 76.0      | 86.0                 | 77.0     | 81.5  | ↘ all over               | 2.082                        | N.W.                   |
| 14    | 29.161     | 88.0         | 87.0    | 79.0      | 88.0                 | 77.2     | 82.6  | Ditto                    | 0.052                        | ..                     |
| 15    | 29.117     | 87.5         | 87.0    | 80.5      | 88.5                 | 77.4     | 82.95 | ↘ scattered              | ..                           | N.W.                   |
| 16    | 29.189     | 87.9         | 87.6    | 79.6      | 86.9                 | 77.0     | 81.95 | ↘ twds. W.               | ..                           | N.W.                   |
| 17    | 29.197     | 86.0         | 86.5    | 81.0      | 80.0                 | 77.2     | 78.6  | ↘ all over               | ..                           | W.                     |
| 18    | 29.195     | 89.5         | 88.5    | 80.1      | 88.0                 | 77.0     | 82.5  | ↘ scattered              | 0.512                        | N.W.                   |
| 19    | 29.245     | 89.5         | 89.3    | 80.4      | 89.2                 | 77.5     | 83.35 | ↘ Ditto                  | ..                           | N.W.                   |
| 20    | 29.261     | 91.0         | 90.6    | 81.9      | 91.0                 | 78.0     | 84.5  | Ditto                    | ..                           | N.W.                   |
| 21    | 29.289     | 92.6         | 92.0    | 80.6      | 91.8                 | 78.0     | 84.9  | Ditto                    | ..                           | W.                     |
| 22    | 29.291     | 90.8         | 89.4    | 79.5      | 89.2                 | 78.0     | 83.6  | Ditto                    | ..                           | N.                     |
| 23    | 29.227     | 93.0         | 91.7    | 80.2      | 92.0                 | 76.0     | 84.0  | Ditto                    | ..                           | N.                     |
| 24    | 29.249     | 94.7         | 93.3    | 81.0      | 94.0                 | 76.2     | 85.1  | ↘ Ditto                  | ..                           | N.W.                   |
| 25    | 29.309     | 92.1         | 91.4    | 80.6      | 92.0                 | 76.5     | 84.25 | Ditto                    | ..                           | N. E.                  |
| 26    | 29.325     | 79.8         | 79.0    | 75.8      | 90.0                 | 77.0     | 83.5  | ↘ all over               | 1.082                        | N. E.                  |
| 27    | 29.301     | 85.2         | 85.6    | 76.3      | 86.0                 | 76.6     | 81.3  | ↘ scattered              | ..                           | N.W.                   |
| 28    | 29.329     | 81.5         | 80.4    | 75.9      | 80.0                 | 77.0     | 78.5  | ↘ Ditto                  | ..                           | E.                     |
| 29    | 29.317     | 84.0         | 84.9    | 76.7      | 84.3                 | 76.2     | 80.25 | ↘ Ditto                  | ..                           | N.W.                   |
| 30    | 29.283     | 89.9         | 89.9    | 75.0      | 89.5                 | 77.4     | 83.45 | Ditto                    | ..                           | N.W.                   |
| Mn.   | 29.176     | 88.9         | 88.2    | 79.8      | 88.7                 | 77.5     | 83.16 | ..                       | 5.004                        | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.371     | 83.3         | 83.7    | 74.2      | ..                   | ..       | ..                     | ~ scattered          |
| 2     | 29.375     | 86.0         | 86.4    | 75.5      | ..                   | ..       | W.                     | Clear [in zenith.    |
| 3     | 29.419     | 86.8         | 88.0    | 73.0      | ..                   | ..       | N. W.                  | ~ very few scattered |
| 4     | 29.431     | 85.0         | 86.5    | 70.5      | ..                   | ..       | N. W.                  | Clear                |
| 5     | 29.441     | 83.2         | 84.7    | 72.0      | ..                   | ..       | N. W.                  | ~ scattered          |
| 6     | 29.397     | 81.9         | 81.9    | 77.6      | ..                   | ..       | N.                     | ~ all over           |
| 7     | 29.355     | 78.5         | 78.5    | 76.6      | ..                   | ..       | N. E.                  | Ditto                |
| 8     | 29.367     | 79.5         | 80.0    | 77.0      | ..                   | ..       | E.                     | Ditto                |
| 9     | 29.405     | 82.2         | 82.4    | 77.5      | ..                   | ..       | S. E.                  | ~ scattered          |
| 10    | 29.505     | 83.5         | 83.7    | 77.8      | ..                   | ..       | W.                     | ~ Ditto              |
| 11    | 29.451     | 81.5         | 81.8    | 74.5      | ..                   | ..       | N. W.                  | ~ Ditto              |
| 12    | 29.419     | 80.8         | 81.5    | 74.8      | ..                   | ..       | N. W.                  | Clear                |
| 13    | 29.451     | 82.7         | 83.0    | 74.0      | ..                   | ..       | S. W.                  | Ditto                |
| 14    | 29.517     | 83.0         | 83.4    | 71.8      | ..                   | ..       | W.                     | Ditto                |
| 15    | 29.505     | 81.0         | 81.3    | 69.5      | ..                   | ..       | ..                     | Ditto                |
| 16    | 29.529     | 78.9         | 80.9    | 64.0      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.509     | 78.0         | 80.3    | 64.0      | ..                   | ..       | N. W.                  | Ditto                |
| 18    | 29.505     | 78.0         | 79.1    | 65.7      | ..                   | ..       | N. W.                  | Ditto                |
| 19    | 29.493     | 79.9         | 81.7    | 64.9      | ..                   | ..       | N.                     | Ditto                |
| 20    | 29.529     | 77.0         | 79.5    | 64.7      | ..                   | ..       | N. W.                  | Ditto                |
| 21    | 29.547     | 77.1         | 78.7    | 64.0      | ..                   | ..       | N.                     | Ditto                |
| 22    | 29.507     | 76.0         | 76.4    | 63.0      | ..                   | ..       | ..                     | Ditto                |
| 23    | 29.497     | 75.0         | 76.8    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 24    | 29.515     | 74.5         | 77.0    | 64.0      | ..                   | ..       | N. W.                  | Ditto                |
| 25    | 29.539     | 77.0         | 79.5    | 63.0      | ..                   | ..       | N. W.                  | Ditto                |
| 26    | 29.531     | 76.2         | 78.0    | 63.0      | ..                   | ..       | N. W.                  | Ditto                |
| 27    | 29.511     | 73.0         | 74.4    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| 28    | 29.539     | 72.5         | 75.0    | 59.0      | ..                   | ..       | N. W.                  | Ditto                |
| 29    | 29.547     | 73.8         | 76.0    | 60.5      | ..                   | ..       | N. W.                  | Ditto                |
| 30    | 29.555     | 75.5         | 78.0    | 66.5      | ..                   | ..       | N. E.                  | Ditto                |
| 31    | 29.533     | 74.0         | 74.0    | 70.0      | ..                   | ..       | E.                     | ~ all over           |
| Mean. | 29.477     | 79.2         | 80.3    | 68.9      | ..                   | ..       | ..                     | ....                 |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.353     | 84.6         | 85.0    | 74.6      | ..                   | ..       | ..                     | ~ scattered          |
| 2     | 29.367     | 88.7         | 89.5    | 74.8      | ..                   | ..       | N. W.                  | Clear [in zenith     |
| 3     | 29.387     | 89.7         | 91.0    | 73.5      | ..                   | ..       | N. W.                  | ~ very few scattered |
| 4     | 29.405     | 87.5         | 89.2    | 71.1      | ..                   | ..       | N. W.                  | Clear                |
| 5     | 29.383     | 87.0         | 88.0    | 72.0      | ..                   | ..       | N. W.                  | ~ scattered          |
| 6     | 29.373     | 84.8         | 85.4    | 77.6      | ..                   | ..       | N.                     | ~ all over           |
| 7     | 29.309     | 79.8         | 78.5    | 76.6      | ..                   | ..       | N. E.                  | Ditto                |
| 8     | 29.329     | 81.6         | 82.3    | 77.5      | ..                   | ..       | E.                     | Ditto                |
| 9     | 29.391     | 85.3         | 85.3    | 78.5      | ..                   | ..       | S. E.                  | ~ scattered          |
| 10    | 29.471     | 85.5         | 85.8    | 77.9      | ..                   | ..       | W.                     | Ditto                |
| 11    | 29.417     | 83.5         | 83.9    | 74.5      | ..                   | ..       | N. W.                  | Ditto                |
| 12    | 29.395     | 84.2         | 84.7    | 74.9      | ..                   | ..       | ..                     | Clear                |
| 13    | 29.433     | 86.3         | 86.5    | 74.0      | ..                   | ..       | W.                     | Ditto                |
| 14    | 29.503     | 85.5         | 86.6    | 71.9      | ..                   | ..       | W.                     | Ditto                |
| 15    | 29.493     | 83.5         | 83.9    | 69.9      | ..                   | ..       | ..                     | Ditto                |
| 16    | 29.513     | 84.5         | 85.5    | 64.4      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.491     | 83.5         | 85.1    | 64.5      | ..                   | ..       | N. W.                  | Ditto                |
| 18    | 29.475     | 82.3         | 84.2    | 65.7      | ..                   | ..       | N. W.                  | Ditto                |
| 19    | 29.475     | 82.5         | 83.4    | 66.0      | ..                   | ..       | N.                     | Ditto                |
| 20    | 29.505     | 81.7         | 83.0    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 21    | 29.527     | 79.9         | 80.9    | 63.4      | ..                   | ..       | N.                     | Ditto                |
| 22    | 29.493     | 79.0         | 79.5    | 63.5      | ..                   | ..       | ..                     | Ditto                |
| 23    | 29.471     | 80.3         | 81.5    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 24    | 29.501     | 79.0         | 80.3    | 64.2      | ..                   | ..       | N. W.                  | Ditto                |
| 25    | 29.501     | 82.0         | 84.5    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 26    | 29.495     | 80.7         | 81.3    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 27    | 29.483     | 78.9         | 80.6    | 60.5      | ..                   | ..       | N. W.                  | Ditto                |
| 28    | 29.523     | 77.5         | 79.0    | 59.5      | ..                   | ..       | N. W.                  | Ditto                |
| 29    | 29.495     | 78.0         | 80.1    | 60.8      | ..                   | ..       | W.                     | Ditto                |
| 30    | 29.481     | 80.0         | 81.1    | 67.8      | ..                   | ..       | E.                     | Ditto                |
| 31    | 29.497     | 73.7         | 71.9    | 69.9      | ..                   | ..       | E.                     | ~ raining            |
| Mean. | 29.449     | 82.6         | 83.4    | 69.0      | ..                   | ..       | ..                     | ....                 |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.*

Maximum pressure observed at 4 p. m.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | 3 Ft. 2 in. from the ground. | Direction of the Wind. |
| 1     | 29.303     | 90.2         | 90.7    | 95.5      | 90.5                 | 77.2     | 83.85 | ~ scattered        | ..                           | ..                     |
| 2     | 29.315     | 93.2         | 92.5    | 77.4      | 92.0                 | 76.7     | 84.35 | ~ scattered        | ..                           | N.W.                   |
| 3     | 29.319     | 94.0         | 94.2    | 73.9      | 93.8                 | 76.0     | 84.9  | Clear              | ..                           | N.W.                   |
| 4     | 29.333     | 93.0         | 93.4    | 71.5      | 93.0                 | 76.0     | 84.5  | Do. [wards W.      | ..                           | N.W.                   |
| 5     | 29.345     | 90.9         | 91.4    | 72.0      | 91.0                 | 75.8     | 83.4  | ~ scattered to-    | ..                           | N.W.                   |
| 6     | 29.269     | 88.3         | 88.3    | 78.2      | 88.0                 | 75.4     | 81.7  | ~ scattered        | ..                           | N. E.                  |
| 7     | 29.219     | 79.5         | 78.0    | 75.2      | 77.7                 | 75.0     | 76.35 | .....              | ..                           | ..                     |
| 8     | 29.225     | 86.0         | 86.3    | 77.0      | 86.0                 | 75.0     | 80.5  | Ditto              | ..                           | E.                     |
| 9     | 29.341     | 88.3         | 87.8    | 78.9      | 87.5                 | 75.6     | 81.55 | Ditto              | ..                           | S. E.                  |
| 10    | 29.399     | 89.5         | 89.5    | 78.4      | 89.0                 | 75.5     | 82.25 | Ditto              | ..                           | S. W.                  |
| 11    | 29.351     | 85.8         | 86.4    | 77.2      | 86.0                 | 74.0     | 80.0  | Ditto              | ..                           | N.W.                   |
| 12    | 29.347     | 88.2         | 87.7    | 74.4      | 88.5                 | 73.0     | 80.75 | ~ Ditto            | ..                           | N.W.                   |
| 13    | 29.391     | 90.8         | 91.0    | 72.9      | 90.6                 | 73.4     | 82.0  | Clear              | ..                           | W.                     |
| 14    | 29.459     | 90.9         | 91.4    | 70.0      | 91.0                 | 72.8     | 81.9  | Ditto              | ..                           | W.                     |
| 15    | 29.447     | 88.2         | 88.6    | 70.3      | 88.0                 | 69.0     | 78.5  | Ditto              | ..                           | ..                     |
| 16    | 29.471     | 88.5         | 88.0    | 65.5      | 88.9                 | 68.0     | 78.45 | Ditto              | ..                           | N.W.                   |
| 17    | 29.437     | 88.6         | 88.5    | 65.0      | 88.5                 | 67.4     | 77.95 | Ditto              | ..                           | N.W.                   |
| 18    | 29.405     | 87.7         | 88.1    | 67.3      | 88.0                 | 67.0     | 77.5  | Ditto              | ..                           | W.                     |
| 19    | 29.411     | 87.9         | 88.5    | 66.4      | 88.0                 | 68.5     | 78.25 | Ditto              | ..                           | N.W.                   |
| 20    | 29.455     | 86.8         | 87.6    | 67.4      | 87.5                 | 70.0     | 78.75 | Ditto              | ..                           | N.                     |
| 21    | 29.471     | 87.0         | 87.4    | 63.0      | 87.5                 | 69.6     | 78.55 | Ditto              | ..                           | N.W.                   |
| 22    | 29.443     | 86.0         | 86.6    | 63.7      | 86.5                 | 65.3     | 75.9  | Ditto              | ..                           | ..                     |
| 23    | 29.409     | 85.2         | 85.4    | 66.6      | 85.5                 | 64.0     | 74.75 | Ditto              | ..                           | N.W.                   |
| 24    | 29.445     | 85.0         | 85.8    | 64.5      | 85.4                 | 63.6     | 74.5  | Ditto              | ..                           | N.W.                   |
| 25    | 29.447     | 87.0         | 86.7    | 68.5      | 86.7                 | 64.7     | 75.7  | Ditto              | ..                           | N.W.                   |
| 26    | 29.417     | 86.6         | 86.3    | 63.2      | 86.4                 | 64.5     | 75.45 | Ditto              | ..                           | N.W.                   |
| 27    | 29.434     | 84.8         | 84.6    | 60.0      | 84.5                 | 63.0     | 73.75 | Ditto              | ..                           | N.W.                   |
| 28    | 29.477     | 83.0         | 82.4    | 62.2      | 82.7                 | 62.0     | 72.35 | Ditto              | ..                           | N.W.                   |
| 29    | 29.423     | 88.0         | 88.2    | 62.5      | 88.0                 | 61.0     | 74.5  | Ditto              | ..                           | N.W.                   |
| 30    | 29.443     | 84.0         | 83.8    | 68.5      | 84.5                 | 61.0     | 72.75 | Ditto              | ..                           | E.                     |
| 31    | 29.437     | 73.0         | 72.2    | 69.9      | 72.3                 | 63.0     | 67.65 | ~ scattered        | ..                           | ..                     |
| Mean. | 29.375     | 84.9         | 85.0    | 68.2      | 87.2                 | 69.7     | 78.49 | ....               | ..                           | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                      |
| 1     | 29.505     | 70.0         | 70.5    | 68.2      | E.                 | ..                | ✓ all over           |
| 2     | 29.471     | 73.5         | 74.5    | 69.0      | E.                 | ..                | ✓ scattered          |
| 3     | 29.497     | 71.5         | 70.9    | 67.5      | E.                 | ..                | ✓ all over           |
| 4     | 29.525     | 74.8         | 75.2    | 68.4      | N. E.              | ..                | ✓ very few scattered |
| 5     | 29.505     | 75.3         | 75.2    | 68.4      | N. E.              | ..                | ✓ all over           |
| 6     | 29.471     | 74.2         | 76.0    | 64.0      | N. W.              | ..                | ✓ scattered          |
| 7     | 29.525     | 70.5         | 71.2    | 61.2      | N. W.              | ..                | Clear                |
| 8     | 29.581     | 73.0         | 74.8    | 60.0      | N. W.              | ..                | Ditto                |
| 9     | 29.647     | 71.6         | 73.4    | 57.4      | N. W.              | ..                | Ditto                |
| 10    | 29.727     | 67.0         | 67.9    | 56.0      | N. W.              | ..                | Ditto                |
| 11    | 29.727     | 69.0         | 71.5    | 55.0      | N. W.              | ..                | Ditto                |
| 12    | 29.643     | 72.0         | 73.5    | 57.0      | N. W.              | ..                | Ditto                |
| 13    | 29.627     | 70.5         | 72.3    | 57.2      | N. W.              | ..                | Ditto                |
| 14    | 29.605     | 68.0         | 69.2    | 58.4      | N.                 | ..                | ✓ scattered          |
| 15    | 29.597     | 69.5         | 70.9    | 59.4      | S.                 | ..                | ✓ Ditto              |
| 16    | 29.647     | 72.0         | 73.5    | 61.5      | S. E.              | ..                | Ditto                |
| 17    | 29.652     | 69.5         | 70.9    | 57.5      | N. W.              | ..                | Clear                |
| 18    | 29.601     | 67.7         | 69.0    | 54.0      | N. W.              | ..                | Ditto                |
| 19    | 29.615     | 71.2         | 73.0    | 54.3      | N. W.              | ..                | Ditto                |
| 20    | 29.633     | 65.8         | 67.4    | 56.5      | N. W.              | ..                | Ditto                |
| 21    | 29.663     | 67.0         | 68.0    | 55.0      | N. W.              | ..                | Ditto                |
| 22    | 29.687     | 65.8         | 67.3    | 54.8      | S. W.              | ..                | Ditto                |
| 23    | 29.663     | 66.0         | 67.9    | 55.2      | N. W.              | ..                | Ditto                |
| 24    | 29.661     | 65.0         | 66.3    | 55.9      | N. W.              | ..                | Ditto                |
| 25    | 29.705     | 65.5         | 67.6    | 60.1      | N. E.              | ..                | Ditto                |
| 26    | 29.699     | 65.0         | 66.5    | 56.0      | N. E.              | ..                | Ditto                |
| 27    | 29.641     | 67.5         | 68.4    | 60.0      | N. E.              | ..                | Hazy                 |
| 28    | 29.607     | 65.5         | 66.6    | 57.0      | N. E.              | ..                | ✓ scattered          |
| 29    | 29.623     | 66.0         | 67.0    | 57.0      | N. W.              | ..                | Ditto                |
| 30    | 29.642     | 67.0         | 68.9    | 59.0      | N. E.              | ..                | Ditto                |
| Mean. | 29.613     | 69.2         | 70.5    | 59.1      | ..                 | ..                | ....                 |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                      |
| 1     | 29.465     | 72.3         | 72.5    | 69.0      | E.                 | ..                | ~ all over           |
| 2     | 29.421     | 75.8         | 77.8    | 68.4      | E.                 | ..                | ~ scattered          |
| 3     | 29.465     | 72.0         | 72.0    | 67.0      | E.                 | ..                | ~ all over           |
| 4     | 29.487     | 77.0         | 77.9    | 67.4      | N. E.              | ..                | ~ very few scattered |
| 5     | 29.439     | 77.4         | 79.0    | 63.0      | N. W.              | ..                | Clear                |
| 6     | 29.455     | 78.5         | 80.3    | 64.0      | S. E.              | ..                | Ditto                |
| 7     | 29.505     | 75.4         | 76.4    | 63.5      | N. W.              | ..                | Ditto                |
| 8     | 29.559     | 77.0         | 78.6    | 60.0      | N. W.              | ..                | Ditto                |
| 9     | 29.637     | 75.7         | 76.3    | 58.4      | N. W.              | ..                | Ditto                |
| 10    | 29.715     | 73.9         | 75.4    | 58.0      | N. W.              | ..                | Ditto                |
| 11    | 29.695     | 74.8         | 76.2    | 56.5      | N. W.              | ..                | Ditto                |
| 12    | 29.611     | 75.5         | 77.0    | 58.0      | N. W.              | ..                | ~ scattered          |
| 13    | 29.601     | 76.3         | 77.5    | 58.5      | N. W.              | ..                | Clear                |
| 14    | 29.589     | 74.0         | 75.5    | 59.5      | N.                 | ..                | ~ scattered          |
| 15    | 29.569     | 75.8         | 77.5    | 61.6      | S. E.              | ..                | ~ Ditto              |
| 16    | 29.615     | 76.5         | 78.7    | 63.0      | N.                 | ..                | Ditto                |
| 17    | 29.615     | 77.0         | 78.0    | 57.0      | N. W.              | ..                | Clear                |
| 18    | 29.583     | 73.5         | 75.0    | 55.2      | N. W.              | ..                | Ditto                |
| 19    | 29.555     | 74.5         | 76.5    | 57.0      | N. W.              | ..                | Ditto                |
| 20    | 29.599     | 71.2         | 72.4    | 57.5      | N. W.              | ..                | Ditto                |
| 21    | 29.637     | 70.2         | 71.9    | 56.5      | N. W.              | ..                | Scattered            |
| 22    | 29.655     | 72.0         | 72.4    | 56.5      | S. W.              | ..                | Clear                |
| 23    | 29.625     | 71.5         | 73.0    | 57.1      | N. W.              | ..                | Ditto                |
| 24    | 29.637     | 70.5         | 71.3    | 60.0      | N. W.              | ..                | Ditto                |
| 25    | 29.671     | 70.2         | 72.7    | 60.9      | N. E.              | ..                | Ditto                |
| 26    | 29.639     | 70.0         | 72.2    | 60.0      | N. E.              | ..                | Ditto                |
| 27    | 29.607     | 71.0         | 71.2    | 61.1      | N. E.              | ..                | Hazy                 |
| 28    | 29.567     | 70.2         | 70.2    | 58.5      | N. E.              | ..                | ~ scattered          |
| 29    | 29.547     | 70.9         | 72.4    | 58.5      | N. W.              | ..                | Ditto                |
| 30    | 29.617     | 73.0         | 73.7    | 60.5      | E.                 | ..                | Ditto                |
| Mean. | 29.579     | 73.7         | 75.0    | 60.4      | ..                 | ..                | ....                 |

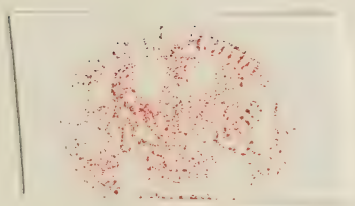
Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.

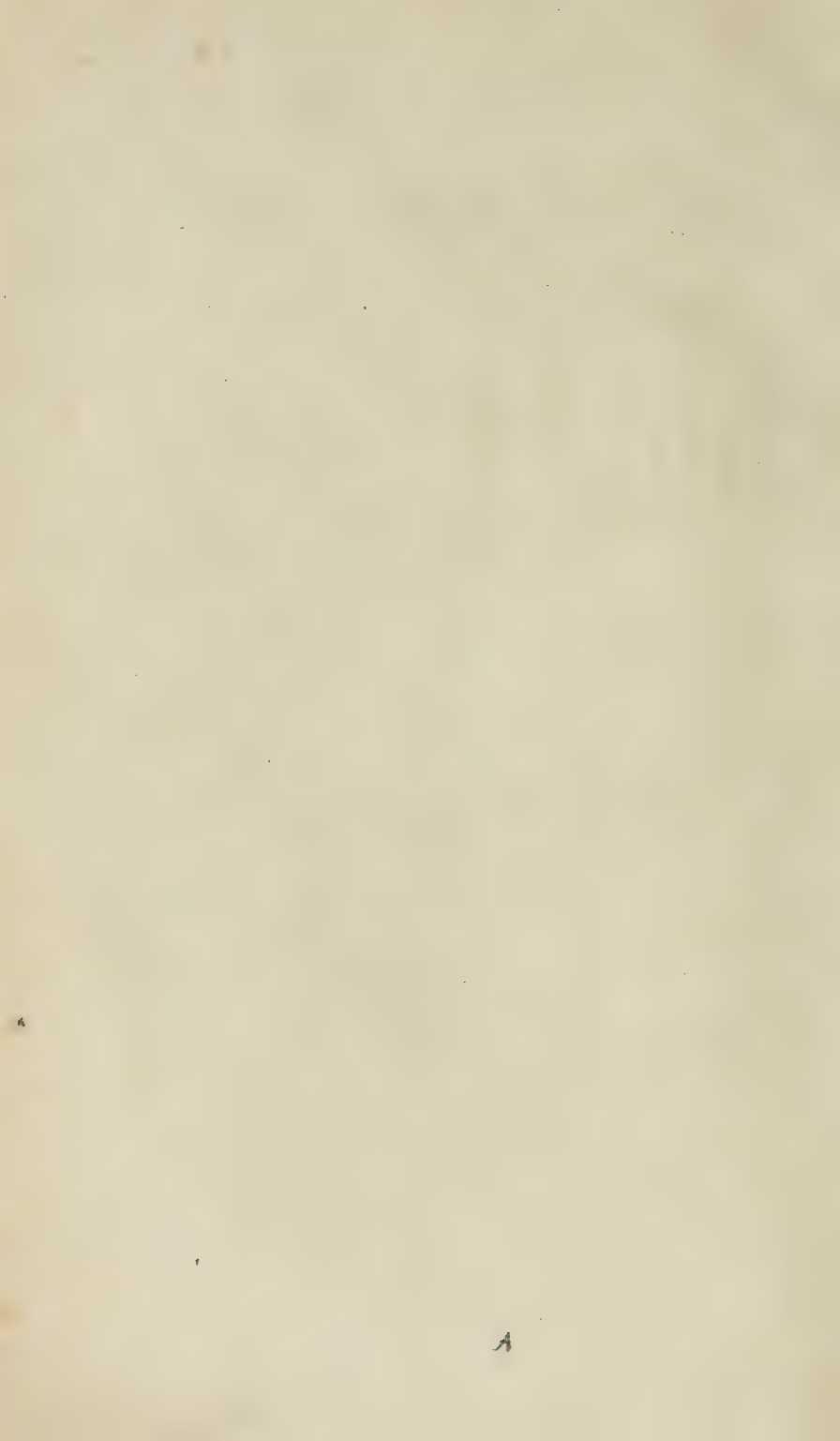
Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.         | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|----------------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                            |                    |                   |
| 1     | 29.415     | 76.5         | 76.0    | 71.0      | 76.0                 | 63.5     | 69.75 | ☁ all over                 | E.                 | ..                |
| 2     | 29.361     | 79.5         | 79.5    | 69.2      | 79.3                 | 64.0     | 71.65 | ☁ scattered                | E.                 | ..                |
| 3     | 29.427     | 74.0         | 73.8    | 68.2      | 73.5                 | 63.7     | 68.6  | ☁ all over                 | E.                 | ..                |
| 4     | 29.421     | 82.0         | 82.0    | 68.8      | 81.6                 | 63.0     | 72.3  | ☁ very few scatter-<br>led | N.                 | ..                |
| 5     | 29.365     | 82.2         | 82.5    | 67.2      | 82.0                 | 66.0     | 74.0  | ☁ scattered                | N.W.               | ..                |
| 6     | 29.379     | 81.9         | 80.7    | 64.0      | 81.4                 | 64.4     | 72.9  | Ditto                      | S. E.              | ..                |
| 7     | 29.467     | 81.4         | 81.4    | 63.9      | 80.9                 | 62.0     | 71.45 | Clear                      | N.W.               | ..                |
| 8     | 29.505     | 81.5         | 81.4    | 61.9      | 81.4                 | 59.0     | 70.2  | ☁ scattered                | N.W.               | ..                |
| 9     | 29.597     | 80.5         | 80.0    | 58.0      | 80.4                 | 56.0     | 68.2  | Clear                      | N.W.               | ..                |
| 10    | 29.659     | 79.7         | 79.2    | 57.5      | 79.4                 | 55.0     | 67.2  | Ditto                      | N.W.               | ..                |
| 11    | 29.637     | 80.0         | 79.5    | 58.5      | 80.0                 | 55.2     | 67.6  | Ditto                      | N.W.               | ..                |
| 12    | 29.591     | 78.8         | 78.5    | 58.4      | 78.3                 | 54.1     | 66.2  | ☁ scattered                | N.W.               | ..                |
| 13    | 29.539     | 83.9         | 84.0    | 60.6      | 84.5                 | 55.2     | 69.85 | Clear                      | N.W.               | ..                |
| 14    | 29.509     | 80.0         | 81.2    | 61.2      | 81.2                 | 54.6     | 67.9  | ☁ scattered                | N.                 | ..                |
| 15    | 29.525     | 80.5         | 80.5    | 64.4      | 80.2                 | 60.0     | 70.1  | ☁ Ditto                    | S. E.              | ..                |
| 16    | 29.561     | 82.7         | 83.2    | 63.1      | 83.6                 | 61.5     | 72.55 | Clear                      | N.W.               | ..                |
| 17    | 29.565     | 80.8         | 80.5    | 58.5      | 81.0                 | 61.0     | 71.0  | Ditto                      | N.W.               | ..                |
| 18    | 29.509     | 78.9         | 78.9    | 57.3      | 78.9                 | 54.0     | 66.45 | Ditto                      | N.W.               | ..                |
| 19    | 29.517     | 79.4         | 79.6    | 58.0      | 79.6                 | 54.2     | 66.9  | Ditto                      | N.W.               | ..                |
| 20    | 29.535     | 76.1         | 76.4    | 58.7      | 76.0                 | 55.0     | 65.5  | Ditto                      | N.W.               | ..                |
| 21    | 29.595     | 76.0         | 77.5    | 59.0      | 77.0                 | 53.2     | 65.1  | Ditto                      | N.W.               | ..                |
| 22    | 29.601     | 77.9         | 78.5    | 57.9      | 78.5                 | 51.5     | 65.0  | Ditto                      | N.W.               | ..                |
| 23    | 29.589     | 76.4         | 76.4    | 58.5      | 76.0                 | 51.0     | 63.5  | Ditto                      | N.W.               | ..                |
| 24    | 29.583     | 74.8         | 74.4    | 61.3      | 75.0                 | 51.0     | 63.0  | Ditto                      | S. E.              | ..                |
| 25    | 29.631     | 75.0         | 75.2    | 61.8      | 75.4                 | 52.5     | 63.95 | Ditto                      | N. E.              | ..                |
| 26    | 29.577     | 75.8         | 76.5    | 60.5      | 75.4                 | 52.0     | 63.7  | Ditto                      | N. E.              | ..                |
| 27    | 29.553     | 72.9         | 72.3    | 61.5      | 72.0                 | 53.5     | 62.75 | ☁ all over                 | N. E.              | ..                |
| 28    | 29.519     | 74.2         | 73.9    | 57.8      | 73.9                 | 52.0     | 62.95 | ☁ scattered                | N.W.               | ..                |
| 29    | 29.525     | 74.5         | 73.7    | 60.0      | 74.9                 | 51.4     | 63.15 | ☁ Ditto                    | N.W.               | ..                |
| 30    | 29.549     | 76.0         | 76.0    | 61.3      | 76.5                 | 52.3     | 64.4  | ....                       | ..                 | ..                |
| Mean. | 29.526     | 78.6         | 78.5    | 61.6      | 78.4                 | 56.7     | 67.6  | ....                       | ..                 | ..                |



















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